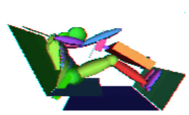
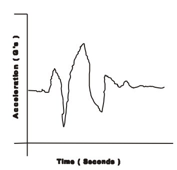
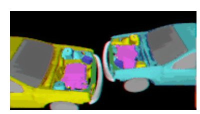
NHTSA
Test Reference Guide
Version 5

Volume I : Vehicle Tests







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National Highway Traffic Safety Administration (NHTSA)

Office of the Associate Administrator for Research and Development

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Preface

This guide and its companion guides are to be used to create formatted submissions of data collected from automotive crash tests.

There are four guides:

Volume I: NHTSA Vehicle Test Reference Guide
Volume II: NHTSA Biomechanics Test Reference Guide
Volume III: NHTSA Component Test Reference Guide
Volume IV: NHTSA Signal Waveform Generator Test Reference Guide (Suspended)

You are reading Volume I, the NHTSA Vehicle Test Reference Guide.

The first step in creating a data submission is to determine which database to use for your test data. The design and partitioning of each database is centered upon the focus of the testing. Test programs focused on the evaluation of the **occupant** should be submitted to the Biomechanics Database; tests focused on the evaluation of **vehicles** belong in either the Vehicle Database or the Component Database; and tests focused on the evaluation of the **data acquisition system** belong in the Signal Waveform Generator Database. Refer to the flow chart in Figure 0-1 Database selection, on the next page, to determine which database is appropriate for your test.

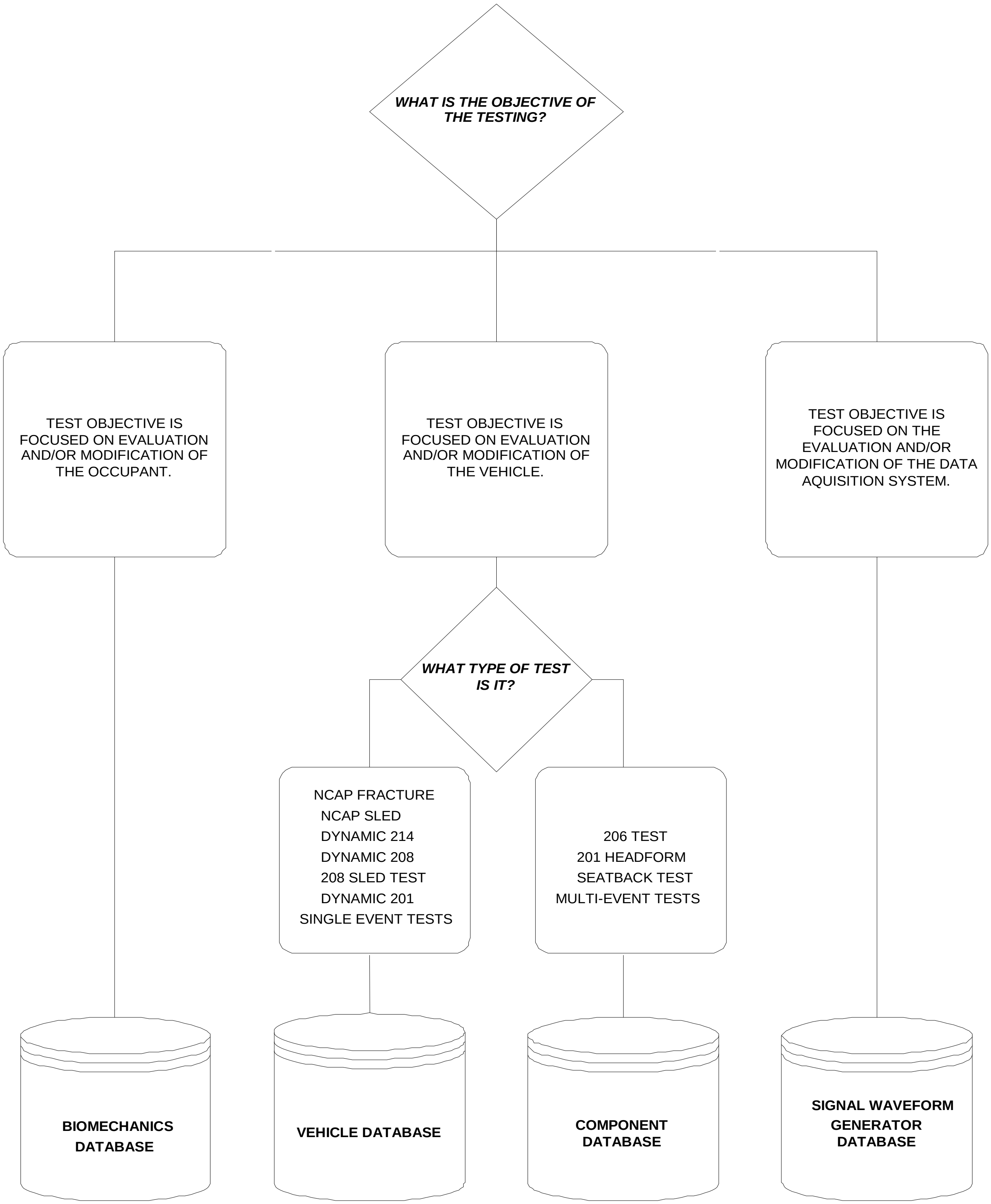

Figure 0-1 Database selection

In Figure 0-1, test types can be found from the NHTSA_TSTTYP table in the NHTSA code library named NCodes.mdb (see ***Section 1.3 A Database for NHTSA Codes***). Several examples may help to illustrate where certain types of tests fit into the databases:

- All regulatory tests shall be submitted to the Vehicle Database or Component Database.
- Tests that are performed as part of the new car assessment program shall be submitted to the Vehicle Database.
- Forward Collision Warning (FCW), Lane Departure Warning (LDW) and Dynamic Rollover (DRO) Test Data shall be submitted to the Vehicle Database.
- Pendulum tests to cadavers shall be submitted to the Biomechanics Database.
- Lateral vehicle-to-vehicle impacts shall be submitted to the Vehicle Database.
- Sled tests with new dummy designs shall be submitted to the Biomechanics Database.
- Tests featuring a car body on a sled designed to evaluate occupant response should be submitted to the Biomechanics Database, except the 206-sled test.
- Tests featuring a car body on a sled designed to evaluate vehicle response should be submitted to the Vehicle Database.
- Tests to record a standard waveform using new car assessment conditioning amplifiers shall be submitted to the Signal Waveform Generator Database.

In many research cases, it will be difficult to determine whether testing is focused on evaluation of the vehicle or evaluation of the occupant. Always check with the COTR in determining which database tests should be submitted. In all cases where the COTR's advice is contrary to this guide, send email to nrd.softdev@nhtsa.dot.gov.

Release Notes

This section details changes between the current revision of this guide, dated as of August 2012, and the revision dated as of March 2006.

Content

- Update NHTSANO (NHTSA Number) from 6 characters to 9 characters.
- Add CURBWT (curb weight) to Vehicle Test Guides.

Code Library

- Code library, *Ncodes.mdb*, explaining codes used in the NHTSA Test Reference Guides are now available through the NHTSA Research and Development web site: Entree for Windows | National Highway Traffic Safety Administration (NHTSA). It is also a database employed for validating codes by the Entrée for windows (see Section 1.3 A Database for NHTSA Codes).

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Introduction

Background

In September of 1966, the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1381) was signed into law in the United States. The Act specifies that the Secretary of Transportation shall establish appropriate Federal Motor Vehicle Safety Standards that would lead to the reduction of the number of deaths and injuries resulting from motor vehicle accidents. In prescribing standards, the Secretary was to consider: (1) relevant motor vehicle safety data, (2) whether the proposed standard is reasonable, practical, and appropriate for the particular type of motor vehicle equipment for which it is prescribed, and (3) the extent to which such standards contribute to carrying out the purposes of the Act.

In order to meet the above requirements, the National Highway Traffic Safety Administration (NHTSA) has been mandated to develop safety standards. For each proposed regulation, an extensive research program is undertaken to ensure that the proposed standard satisfies the requirements of the Act. For each test conducted for the agency, data is recorded from various transducers mounted to the test dummies or vehicles, high-speed films or videos are recorded to document the event, still pictures of the test setup are taken, and a written report is generated. Since 1978, these data have been loaded into a single data repository, where NHTSA staff and the public can access the data and conduct analysis.

This reference guide has been written for two reasons. The first is to document the format and content requirements for submission of data, film, video, and reports to the NHTSA database. The second is to encourage the adoption of this standardized format so that the exchange of data by the safety research community is readily accomplished and ultimately leads to new and better ways for reducing the fatalities and injuries in motor vehicle accidents.

Data Organization

Four types of crash test data can be submitted to the NHTSA Vehicle Crash Test database:

- **Electronic Data** (Chapter 2) - General quantitative information about the test setup and results as well as transducer output time-history data.

- **Written Report** (Chapter 3) - A report containing information about the test, such as test setup diagrams and test anomalies. The written report should be submitted in digital form using the Adobe PDF format. Alternatively, a paper copy of the report is acceptable.

- **Pre/Post-Event Images** (Chapter 4) - Pre- or post- event images of the test environment. These may be in the form of film or digital video, time sequenced or still images.

- **Event Images** (Chapter 5) - Film, video, or still images captured during the impact event. The images may be submitted on processed prints from photo-reactive film or on CCD cameras.

Chapters 2 through 5 of this guide provide instructions for formatting of each the above data types.

Digital Media Formats and Software Tools

The digital crash test information should be submitted to NHTSA via CD/DVD ROMs or downloadable web sites. ***Chapter 1 : Media Formats and Software Tools*** describes details on acceptable media, the layout of directories and files on the media, and software tools for generating quality formatted specification files.

Other Media Formats

Other media, including high-speed films, VHS or BETA videotapes, paper reports, or X-Rays should be submitted along with the digital media. If you have data that you wish to submit but which is not specified in this guide, please send email to

nrd.softdev@nhtsa.dot.gov

or contact the NHTSA COTR responsible for your submission.

Return Policy

Submissions that cannot be processed, or which have too many errors found by the validation system of the software, ***Entrée V5 for windows***, will be returned to the contractor to be corrected and resubmitted.

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Chapter 1 : Media Formats and Software Tools

Each submission consists of multiple types of data: descriptive test information defined later in this guide, measurement data digitized from the test instrumentation signal traces, a written report of the testing, and still images and video before, during, and after the test event. Several pieces of physical media may be necessary to record all of this information for submission.

1.1 Media Types and Layout

All submissions should be submitted by CD/DVD ROMs, or posted in a downloadable web site, where there should be a directory structure in accordance with the following:

1) **Parent directory name** - All data for each submitted test should be in a directory created in

   \<TSTREF>\

   <TSTREF> is the value from the TSTREF in Chapter 2 of this guide. So, if TSTREF = ‘IMPACT123', then the directory for all data for this test shall be stored in the directory, \IMPACT123\. Users should avoid illegal filename characters (‘\’, ‘*’, ‘?’) when choosing a value for TSTREF, so as not to interfere with the directory naming convention. Each piece of media should have a printout listing each TSTREF on the media.

2) **Electronic Data** - In accordance with the format in Chapters 1 and 2, the EV5 specification file and associated transducer signal files shall be stored in the subdirectory

   \<TSTREF>\DATA

3) **Written Report** - In accordance with Chapter 3, digital reports in PDF format shall be stored in the subdirectory

   \<TSTREF>\REPORT

4) **Pre/Post-Event Images** – In accordance with Chapter 4, still images and video captured before and after the impact event shall be stored in the subdirectory

   \<TSTREF>\PREPOST

5) **Event Images** - In accordance with Chapter 5, still images and video of the impact event, including high speed video files, shall be stored in the subdirectory

   \<TSTREF>\EVENT

1.2 A Data Entry Software – Entrée V5 for Windows

NHTSA has developed a data entry software tool, Entrée V5 for Windows, to facilitate preparation of the specification data defined in ***Chapter 2 : File Formats and File Formats*** and Information Records. Because EntreeV5 contains a built-in data validation system, it is highly recommended that specification data be generated using this tool.

In addition to producing new specification files, Entrée V5 for Windows can import ASCII data files generated by previous versions of Entrée, typically of type EV4, EV5, or GR* (EV3). Once one of these files has been imported, it can be written to a new EV5 specification file (an ASCII file in the EV5 format).

1.2.1 System Requirements

The software is a Windows-based application for the Microsoft Windows XP environment with the following operating requirements:

- Hardware (CPU, memory, and disk space) according to Microsoft recommendations.
- 24 MB of disk space to install, and 12 MB of disk space during normal use.
- SVGA display adapter with resolution 1024x768, preferably using font size "small."
- A CD/DVD ROM driver.
- Database *Ncodes.mdb* that can be downloaded from the NHTSA Research and Development web site.

It may work in Windows NT Workstation 4.0 with Service Pack 6a or later. While the software may run under Microsoft Windows Millennium or Windows 2000, it has not been tested in those environments.

1.2.2 A Customer Developed Software

NHTSA provides access to the source code for the Entrée for Windows program as a separately downloadable package on the Entrée web pages (See **Appendix B-1 Reference Guide Updates and Software Updates**). This source code package may be used as an educational resource in understanding how the Entrée application works, and the logic used in generating an EV5 file. However, the source code may not be suitable for direct inclusion in customer-developed software.

NHTSA does not provide source code for customers to develop their own software to write data compatible with the EV5 specification. This guide and files produced by Entrée V5 for Windows may be conditionally compatible with the engineering specification.

1.3 A Database for NHTSA Codes

The build-in code-validation system of Entrée V5 for Windows is based on the database Ncodes.mdb, defined by NHTSA Research and Development. This database includes more than 80 tables related to all “Search” buttons in Entrée V5 for Windows. For example, the table related to the test type is named NHTSADB_TSTTYP that lists test types for all acceptable tests. A comprehensive reference for currently acceptable codes can be checked out through “Search” buttons of Entrée V5 for Windows.

This database is mainly employed for instant code validations and valid code selections. If an existing data file is loaded into Entrée V5 for Windows, unacceptable codes will be detected and highlighted by the validation system. Neither a page including an unacceptable code can be switched to another one, nor a new data file can be generated, until the invalid code is replaced by one checked out through the related “Search” button.

The user can find a required code from a table in the database directly if the Microsoft Excel is ready. However, it is not a good way to search, especially when the code is indirectly related to multiple tables.

The Entrée for Windows is a friendly code searcher. For example, to determine which test type should be used, open the General Test Information page for an arbitrary database in Entrée V5 for Windows, and click on the search button for test type. Then a pop-up box appears, listing all codes of test types for this database only. If no listed code is acceptable, then switch to another database. If an appropriate code is found, the test type is determined and the data format can be determined.

The database might be updated in accordance with new requirements. The latest version can be downloaded from the NHTSA Research and Development web site: Entree for Windows | National Highway Traffic Safety Administration (NHTSA).

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Chapter 2 : File Formats and Information Records

As a primer to understanding the following sections, please review specification data types. We have categorized specification data so as to make it easier to model specification data and engineering requirements.

A specification data includes its name, type, unit, range, and order number in an information record. For convenience, it is called a field also. The field name is usually a short name of a test parameter, and it is used as the column name in the database of NHTSA. The unit is optional and predefined. The type and range are validated automatically in editing an EV5 file through EntréeV5 for windows. All fields are described from ***Section 2.3 General Test Information*** to ***Section 2.10 High-Speed Video Information***.

2.1 Field Types

- **Text** – A textual string whose content is not strictly governed by a rule, white-space, and a limited set of special characters including [ ] ( ) , : - + and _. This data type usually has a maximum length.

- **Code –** A textual string whose content is limited to a predefined set of codes that can be found through a “Search” button in a page of EntréeV5 for windows. A code has a preset length. Codes used in EntréeV5 for windows are defined by the R & D of NHTSA.

- **Integer –** An integer is expressed as one optional sign character (- or +) and one or more numeric characters, or digits, in the range from 0 – 9. The absence of a sign character implies a positive value. An integer in an EV5 file has its limits usually.

- **Real** – A real (floating point or decimal number) is expressed as one sign character (- or +), one or more numeric characters, or digits, in the range from 0 – 9, a decimal point ‘.’, and one or more numeric characters in the range from 0 – 9. The absence of a sign character implies a positive value. A real in an EV5 file has its limits usually.

  The representation of a real as a textual string may be governed by a rule that specifies a total text length for placement of the sign and decimal number, and relative sizes and format of the mantissa and exponent.

- **Date** – A textual string whose content represents a calendar date of the format ‘DD/MMM/YYYY’. The maximum length of a Date is limited to 11 characters.

The ‘DD’ portion is the numeric day of the month, padded to a width of two (2) characters with a leading zero, in the range from 1 – 31.

The ‘MMM’ portion is the three-character uppercase alphabetic abbreviation of the month (e.g. ‘JAN’, ‘FEB’, ‘MAR’, ‘APR’, ’MAY’, ’JUN’, ’JUL’, ’AUG’, ’SEP’, ’OCT’, ’NOV’, ’DEC’).

The ‘YYYY’ portion is a four-digit year (e.g. ‘2006’).

2.2 Specification Files and Signal Files

A file system for a vehicle test consists of two parts:

(1) Three specification files whose extensions are .EV5, .IP5 and .HS5
(2) A set of signal (curve or channel data) files

An IP5 and an HS5 files record the intrusion information and the high-speed video information, respectively. Note that the EV5, IP5 and HS5 files for the same test must have the same test reference number (see TSTREF in ***Section 2.3 General Test Information***). Software Entrée V5 for windows edits and validates specification files only. Signal files can be edited and generated by any available text editors.

2.2.1 Structures of Specification Files

An EV5 file consists of a subset of eight (information) record sets named "General Test", "Vehicle", "Barrier", "Occupant", "Occupant restraint", "Instrumentation", “Intrusion” and “High Speed Video”, respectively. For example, an EV5 file for a vehicle test might consist of following record sets: "General Test", "Vehicle", "Barrier", "Occupant", "Occupant restraint", and "Instrumentation". In contrast, an IP5 and an HS5 files consist of an “Intrusion” and a “High Speed Video” record sets, respectively.

A record set consists of one or more information records with the same name of the record set. For example, Record set, "General Test", always includes only one record while record set “Instrumentation” always include more than one record.

An information record consists of a sequence of fields (specification data) separated by pipes ('|'s); and it is listed in the same line of a specification file. An unavailable specification data is replaced with an empty space or a blank character. For example, a record with a data sequence, d_1, d_2, ,… d_{n-1}, d_n, is expressed as “d_1| d_2| …| d_n” delimited by a line feed. If d_1 and d_n are unavailable, this record is expressed as “ | d_2| …, |d_{n-1}| ” or “|d_2| …, |d_{n-1}|”.

The flowchart in ***Figure 2-1*** indicates the logical relation of the information record sets for a vehicle test. It can be used to determine what record sets should be included in an EV5 file.

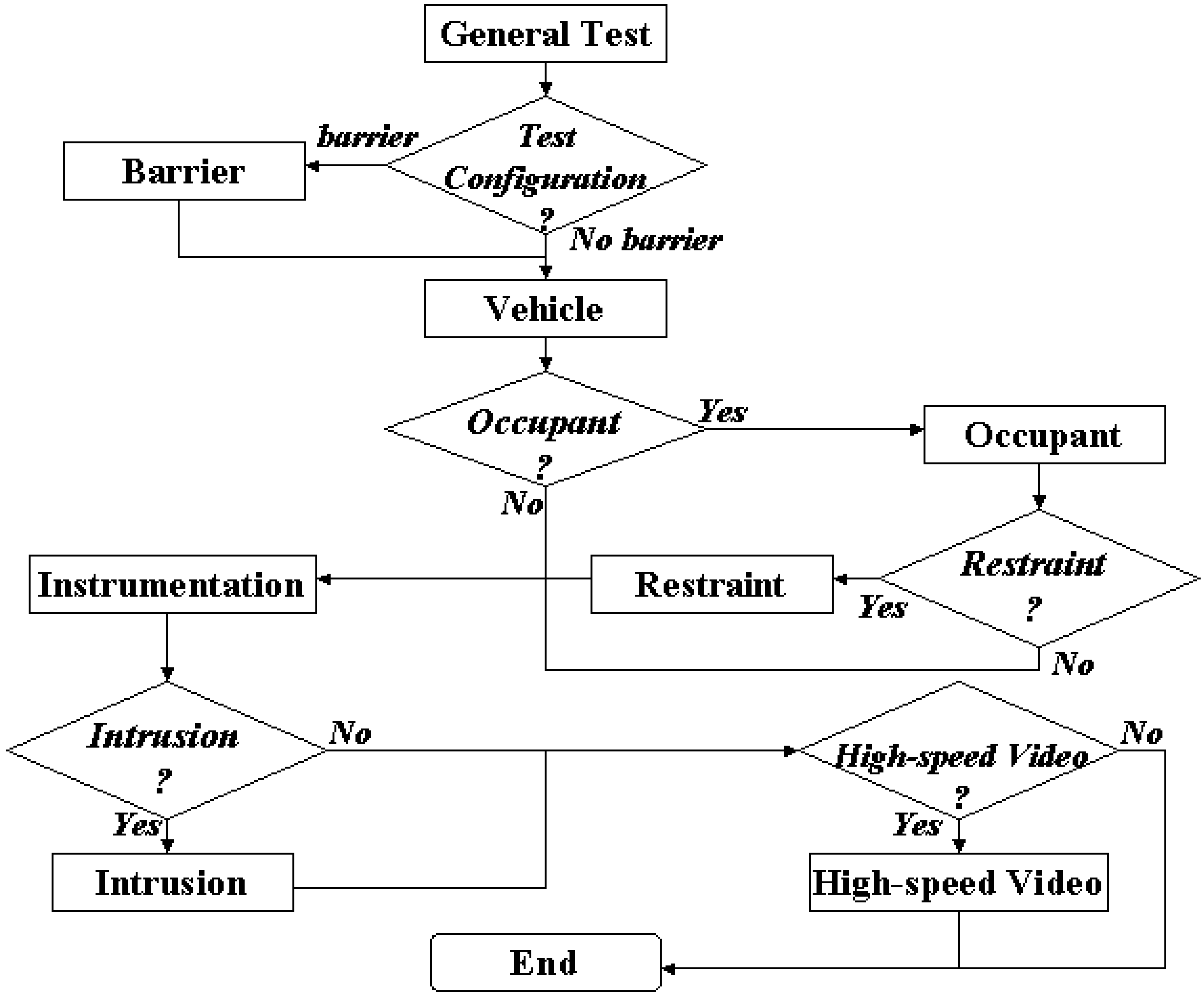

Figure 2-1 A flowchart for determining vehicle information record sets in an EV5 file

If there are no comment lines on the beginning of a specification file, the first line of the file should be the string

“----- *extension* -----”

or

“-----”+space+ “*extension*”+space+“-----”

where *extension* = EV5, IP5 or HS5 for EV5, IP5 and HS5 files respectively. A specification file should terminate with the line

“----- END -----”

Within the body of a specification file, each section should begin with a record set key line to indicate the beginning of a record set. A record set key line is expressed as

"----- RECORD SET KEY -----"

or

"-----"+space+ RECORD SET KEY+space+ "-----"

where the RECORD SET KEY is given in Table 2-1.

Comments within a specification file are allowable anywhere in the file, but must start on a new line with the # (pound) sign and end with a line feed.

RECORD (SET) NAME	RECORD SET KEY	NOTE
General Test	TEST	Must be included
Vehicle	VEHICLE	Must be included
Barrier	BARRIER	Optional
Occupant	OCCUPANT	Optional
Occupant Restraint	RESTRAINT	Optional
Instrumentation	INSTRUMENTATION	Must be included
Intrusion	INTRUSION	Optional, Output to an IP5 file
High Speed Video	HSVD	Optional, Output to an HS5 file

Table 2-1 EV5 information record sets and their keys

2.2.2 Specification File Examples

File examples (not for the same test) are given in the following. Please note that while the records in the EV5 file example appear to span lines, in actuality, they are continuous and have been wrapped to fit this page.

- **An Example for an EV5 file:**

```
# Source: Entree for Windows v5
# Date: <4/19/2005>
----- EV5 -----
----- TEST -----
V5|NCAP SIDE IMPACT - 2005 PONTIAC G6 4-DOOR SEDAN|TO GENERATE SIDE IMPACT PERFORMANCE INFORMATION
WITH H3 HEAD AND NECK|12/APR/2005|KAR|DTNH22-03-D-32005|G50104|NCA|ITV|CON|DRY|25|DDA|OTH|61.97|270|
|-207|76|NO COMMENTS
----- VEHICLE -----
1|32|01| | |NA| | | |NA|1361|2590|4115|1676|1127|NA|NAP|R|NO COMMENTS| | | | | | | | | | | | | | | |
| | | | | |61.97|27|0|DE|NA|NA| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|NHTSA SIDE IMPACT MOVING DEFORMABLE BARRIER (MDB) 27 DEG. CRAB ANGLE
2|03|99|2005|G50104|4S|1G2ZG548954167316|V6TF|3.5|AF|1767|2858|4797|1786|1134|UN|UNK|P|NO COMMENTS| |
| | | | | | | | | | | | | | | | | | | |0.00|0|297|NA|DE|DE|32|215|223|227|200|-25|10LPAW3|2250|-
555|240| | | | | | | | | | | | | | | | | | | | |27|90|MODEL: G6
----- OCCUPANT -----
```

```
2|01|S3| |M| | |HS|50|MFG: FTSS, MODEL: SA-SID-M001, S/N: 274|NO COMMENTS|SID WITH HIII HEAD AND
NECK|420|696|228|290|572|305|95|140|185| | | | |CN|AB|NO|AB|NO|DR|NO|199|24.00|49.70| | | | | |
|56|54|NO COMMENTS
2|04|S3| |M| | |HS|50|MFG: FTSS, MODEL: SA-SID-M001, S/N: 275|NO COMMENTS|SID WITH HIII HEAD AND
NECK| | |268|340| | |40|95| |674| |570|223|CN|AB|CP|OT|NO|DR|NO|428|43.00|60.80| | | | | |
|52|51|CNTRC1: DOOR PANEL
----- RESTRAINT -----
2|01|1|3PT|BC|NA|NO COMMENTS
2|01|2|ABG|HS|DP|CURTAIN AIRBAG
2|01|3|ABG|SB|DP|SEAT MOUNTED AIRBAG
2|04|1|3PT|BC|NA|NO COMMENTS
2|04|2|ABG|HS|DP|CURTAIN AIRBAG
----- INSTRUMENTATION -----
2|1|AC|01|HDCG|XL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24149|12/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|2|AC|01|HDCG|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24288|12/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|3|AC|01|HDCG|ZL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J21776|13/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|4|AC|01|HDCG|XL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:|12/SEP/2000|2000|999|0.00|-
300|2999|100|AM|R|NO COMMENTS
2|5|AC|01|HDCG|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:|12/SEP/2000|2000|999|0.00|-
300|2999|100|AM|R|NO COMMENTS
2|6|AC|01|HDCG|ZL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:|13/SEP/2000|2000|999|0.00|-
300|2999|100|AM|R|NO COMMENTS
2|7|LC|01|NEKU|XL|SEC|NWT|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|8900|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|8|LC|01|NEKU|YL|SEC|NWT|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|8900|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|9|LC|01|NEKU|ZL|SEC|NWT|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|13350|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|10|LC|01|NEKU|XL|SEC|NWM|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|282|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|11|LC|01|NEKU|YL|SEC|NWM|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|282|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|12|LC|01|NEKU|ZL|SEC|NWM|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|282|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|13|AC|01|RBLU|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J21834|13/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|14|AC|01|RBLL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24567|13/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|15|AC|01|SPNL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24532|13/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|16|AC|01|PVCN|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
A14289|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|17|AC|01|RBLU|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24537|14/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|18|AC|01|RBLL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24581|14/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|19|AC|01|SPNL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24531|14/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|20|AC|01|PVCN|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24286|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|21|ET|01|RBLM|NA|SEC|NON|2900|MFR: TAPESWITCH, MODEL: 8 OZ. YELLOW|01/SEP/2000|200|999|0.00|-
300|2999|100|AM| |EVENT/CONTACT SWITCH, ON/OFF, LEFT THORAX
2|22|ET|01|PVHP|NA|SEC|NON|2900|MFR: TAPESWITCH, MODEL: 8 OZ. YELLOW|01/SEP/2000|200|999|0.00|-
300|2999|100|AM| |EVENT/CONTACT SWITCH, ON/OFF, LEFT PELVIS
2|23|AC|04|HDCG|XL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J23971|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|24|AC|04|HDCG|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J28678|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|25|AC|04|HDCG|ZL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J27589|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|26|AC|04|HDCG|XL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:|12/SEP/2000|2000|999|0.00|-
300|2999|100|AM|R|NO COMMENTS
2|27|AC|04|HDCG|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:|12/SEP/2000|2000|999|0.00|-
300|2999|100|AM|R|NO COMMENTS
```

```
2|28|AC|04|HDCG|ZL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:|13/SEP/2000|2000|999|0.00|-
300|2999|100|AM|R|NO COMMENTS
2|29|LC|04|NEKU|XL|SEC|NWT|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|8900|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|30|LC|04|NEKU|YL|SEC|NWT|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|8900|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|31|LC|04|NEKU|ZL|SEC|NWT|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|13350|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|32|LC|04|NEKU|XL|SEC|NWM|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|282|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|33|LC|04|NEKU|YL|SEC|NWM|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|282|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|34|LC|04|NEKU|ZL|SEC|NWM|2900|MFR:R.A. DENTON, MOD:1716, S/N:280|02/OCT/1999|282|999|0.00|-
300|2999|100|AM| |NO COMMENTS
2|35|AC|04|RBLU|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J21726|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|36|AC|04|RBLL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J21730|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|37|AC|04|SPNL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J21735|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|38|AC|04|PVCN|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J21815|20/SEP/2000|2000|999|0.00|-300|2999|100|AM|P|NO COMMENTS
2|39|AC|04|RBLU|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24538|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|40|AC|04|RBLL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24512|15/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|41|AC|04|SPNL|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J24533|20/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|42|AC|04|PVCN|YL|SEC|G'S|2900|MFR: ENDEVCO, MODEL: 7264-2000, S/N:
J20676|20/SEP/2000|2000|999|0.00|-300|2999|100|AM|R|NO COMMENTS
2|43|ET|04|RBLM|NA|SEC|NON|2900|MFR: TAPESWITCH, MODEL: 8 OZ. YELLOW|01/SEP/2000|200|999|0.00|-
300|2999|100|AM| |EVENT/CONTACT SWITCH, ON/OFF, LEFT THORAX
2|44|ET|04|PVHP|NA|SEC|NON|2900|MFR: TAPESWITCH, MODEL: 8 OZ. YELLOW|01/SEP/2000|200|999|0.00|-
300|2999|100|AM| |EVENT/CONTACT SWITCH, ON/OFF, LEFT PELVIS
2|45|AC|NA|DSRF|XG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-200|03/APR/2000|200|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #1, NO COMMENTS
2|46|AC|NA|DSRF|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-200|03/APR/2000|200|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #1, NO COMMENTS
2|47|AC|NA|DSRF|ZG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-200|03/APR/2000|200|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #1, NO COMMENTS
2|48|AC|NA|DSRR|XG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|08/APR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #2, NO COMMENTS
2|49|AC|NA|DSRR|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|01/APR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #2, NO COMMENTS
2|50|AC|NA|DSRR|ZG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|01/APR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #2, NO COMMENTS
2|51|AC|NA|TRFC|XG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|03/MAY/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #3, NO COMMENTS
2|52|AC|NA|TRFC|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|14/APR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #3, NO COMMENTS
2|53|AC|NA|TRFC|ZG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|25/MAR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #3, NO COMMENTS
2|54|AC|NA|DSLR|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|19/MAY/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #4, NO COMMENTS
2|55|AC|NA|DSLF|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|01/APR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #5, NO COMMENTS
2|56|AC|NA|DR1C|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|03/SEP/1999|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #6, NO COMMENTS
2|57|AC|NA|FLRR|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-200|02/SEP/1999|200|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #7, NO COMMENTS
2|58|AC|NA|DR1M|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|01/APR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #8, NO COMMENTS
2|59|AC|NA|DR1U|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|19/MAY/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #9, NO COMMENTS
2|60|AC|NA|DR4M|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|24/JUN/1999|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #10; NO COMMENTS
2|61|AC|NA|DR4U|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|24/JUN/1999|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #11, NO COMMENTS
```

```
2|62|AC|NA|BPLL|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|03/SEP/1999|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #12, LOWER, NO COMMENTS
2|63|AC|NA|BPLL|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|19/MAY/1999|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #13, MIDDLE, NO COMMENTS
2|64|AC|NA|APLL|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|02/SEP/1999|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #14, LOWER, NO COMMENTS
2|65|AC|NA|APLL|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|24/MAR/2000|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #15, MIDDLE, NO COMMENTS
2|66|AC|NA|STLF|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|03/SEP/1999|500|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #16, NO COMMENTS
2|67|AC|NA|STLR|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-500|03/SEP/1999|500|999|0.00|-
300|2999|100|MN| |ACCEL. LOCATION #17, NOT INSTALLED
2|68|AC|NA|VECG|XG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-200|25/AUG/1999|200|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #18, NO COMMENTS
2|69|AC|NA|VECG|YG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-200|25/AUG/1999|200|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #18, NO COMMENTS
2|70|AC|NA|VECG|ZG|SEC|G'S|2900|MFR: I.C. SENSOR, MODEL: 3031-200|25/AUG/1999|200|999|0.00|-
300|2999|100|AM| |ACCEL. LOCATION #18
1|71|AC|NA|SLED|XG|SEC|G'S|1650|MFR: I.C. SENSOR, MODEL: 3031-200|23/SEP/2002|200|999|55.16|-
308|3009|100|AM| |MDB CG X
1|72|AC|NA|SLED|YG|SEC|G'S|1650|MFR: I.C. SENSOR, MODEL: 3031-200|23/SEP/2002|200|999|28.11|-
308|3009|100|AM| |MDB CG Y
1|73|AC|NA|SLED|ZG|SEC|G'S|1650|MFR: I.C. SENSOR, MODEL: 3031-200|23/SEP/2002|200|999|0.00|-
308|3009|100|AM| |MDB CG Z
1|74|AC|NA|FRCR|XG|SEC|G'S|1650|MFR: I.C. SENSOR, MODEL: 3031-200|23/SEP/2002|200|999|55.16|-
308|3009|100|AM| |MDB LEFT REAR X
1|75|AC|NA|FRCR|YG|SEC|G'S|1650|MFR: I.C. SENSOR, MODEL: 3031-200|23/SEP/2002|200|999|28.11|-
308|3009|100|AM| |MDB LEFT REAR Y
1|76|ET|NA|BMPF|NA|SEC|VOL|1650|MFR: TAPESWITCH, MODEL: 40 OZ. GREY|23/SEP/2002|200|999|0.00|-
308|3009|100|AM| |RIGHT BUMPER CONTACT, REFERENCE TO T=0 MOUNTED ON LEFT BUMPER
    ----- END -----
```

- **An Example for an IP5 File:**

```
# Source: Intrusion Data
# Date: <11/29/2005>
----- INTRUSION -----
1|14|D|63|98|-42|60|97|-43|CEF0326A
1|12|D|81|113|-64|79|114|-61|CEF0326A
1|13|D|81|83|-63|79|84|-61|CEF0326A
1|10|D|111|99|-93|104|103|-89|CEF0326A
1|4|D|134|115|-93|125|117|-89|CEF0326A
1|5|D|134|100|-93|120|102|-88|CEF0326A
1|6|D|134|85|-93|124|87|-90|CEF0326A
1|11|D|134|125|-93|127|125|-89|CEF0326A
1|15|D|57|123|-107|56|126|-106|CEF0326A
1|15|P|57|77|-106|57|80|-104|CEF0326A
----- END -----
```

- **An Example for an HS5 File:**

```
# Source: High Speed Video Data
# Date: <11/29/2005>
----- HSVD -----
1|V4537C|0.001|DRIVER FRONT VIEW|NO COMMENTS
2|V4537C|0.001|DRIVER VIEW|NO COMMENTS
3|V4537C|0.001|PASSENGER VIEW|NO COMMENTS
4|V4537C|0.001|REAR SIDE VIEW|NO COMMENTS
5|V4537C|0|MOVIE TC01-202|
----- END -----
```

2.2.3 Signal Data

Each subsequent file after an EV5 file contains unfiltered, digitized signal data collected from the sensors used in the tests. The order of signal files corresponds to the order of the instrumentation information records in the record set. A signal file is made up of ASCII records of 1 data point each, delimited by a line feed character (ASCII decimal 10, hexadecimal \x0a, octal \012). If a X-Y signal in which the independent X coordinate is non-uniformly incremental - is supplied, then each signal data consists of 1 data point each with the X coordinate listed first, followed by a single tab character, followed by the associated Y coordinate, and ending with a line feed character. The following two examples express two types of signal data in signal files.

- **Signal data for Y coordinate only:**

```
-.206786E-02
0.285321E-01
0.285321E-01
-.632679E-01
0.285321E-01
-.206786E-02
0.285321E-01
-.632679E-01
-.632679E-01
-.206786E-02
0.285321E-01
-.206786E-02
-.326679E-01
-.206786E-02
-.206786E-02
-.206786E-02
-.206786E-02
-.326679E-01
0.285321E-01
```

- **Signal data for X-Y coordinates:**

```
-0.025000000	0.0
-0.024875002	0.0
-0.024750002	-0.12266
-0.024625001	0.12266
-0.024500001	0.0
-0.024375001	-0.24532
-0.024250000	0.0
-0.024125000	0.0
-0.024000000	-0.12266
-0.023875002	0.0
-0.023750002	0.0
-0.023625001	0.0
-0.023500001	0.12266
-0.023375000	0.0
-0.023250000	0.0
-0.023125000	-0.12266
```

```
-0.023000002       0.0
-0.022875002       0.0
-0.022750001       0.24532
-0.022625001       0.0
-0.022500000       0.0
-0.022375000       -0.12266
```

A point expression will allow for any floating-point format, but a preferred format is the C format %12.5E. Thus, each Y-data only will be 12 characters wide (e.g. +1.23456E-01) and each X-Y data will be a maximum of 25 characters wide (e.g. +1.23456E-01<tab>-9.87654E+02). The maximum number of points for one channel is 110,000. There cannot be more than 10,000 data points prior to time zero nor more than 99,999 after time zero.

The title of the ASCII signal files should be the same given to the specification (EV5) file described above followed by a numeric file extension. The file extension should be the curve number of the curve contained in the file, padded on the left with zeroes to three characters, and should correspond to the curve number in the instrumentation information record set.

If the specification file is named TSTABC.EV5, and there are 35 signal (curve) files, the signal files should be named TSTABC.001 through TSTABC.035.

Right	TSTABC.001	TSTABC.012	TSTABC.101
Wrong	TSTABC.T0	TSTABC.12	TSTABCDAT

Table 2-2 Signal filename examples

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2.3 General Test Information

Fields defined below constitute the general test information record. A field includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "**1**", "**VERNO** ", "**Version Number**", and " Pre-defined code, 2 characters " are its order index in the general test information record, its name, its brief description, and its type and range, respectively. Any use of the code for “OTHER” should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

1. VERNO — Version Number

Pre-defined code, 2 characters

VERNO should be chosen for all vehicle crash tests. The number of this version of the NHTSA Test Reference Guide is a special pre-assigned code (V5).

However, it can be another code for identifying the version of the reference guide used to prepare contents of specification files. Therefore, it does not refer to the format of the files within an EV5 file.

For example, it is possible to convert an existing specification file for a vehicle test from the version 3 format, having GR files, into an EV5 format file. Since the original file was developed using the version 3, VERNO would then have a value of “V3” (see the table below)
.

CODE	DESCRIPTION
V5	Data prepared according to the version 5 guide.
V4	Data prepared according to the version 4 guide.
V3	Data prepared according to the version 3 guide.
V2	Data prepared according to the version 2 guide.

2. TITLE — Contract or Study Title

Text with or within 70 characters

TITLE is the title of the contract or study.

3. TSTOBJ — Test Objectives

Text with or within 70 characters

TSTOBJ is a description of the purpose of the test.

4. TSTDAT — Test Date

Date, format (DD/MMM/YYYY), 11 characters

TSTDAT is the date the test was performed. *This field must be filled with a valid date.* **Don’t leave it blank, please.**

5. TSTPRF — Test Performer

Code, 3 characters

TSTPRF is the code for the name of the organization performing the test.

6. CONNO — Contract Number

Text with or within 17 characters

CONNO is the Department of Transportation contract number assigned by the sponsoring organization.

7. TSTREF — Test Reference Number

Text with or within 16 characters

TSTREF is an alphanumeric code number assigned to the test by the test performer.

8. TSTTYP — Test Type

Code, 3 characters

TSTTYP indicates the type of test conducted, such as NCA for a new car assessment test.

9. TSTCFN — Test Configuration

Code, 3 characters

TSTCFN describes the test setup. A vehicle-to-vehicle impact would be coded as VTV, for example.

10. TKSURF — Test Track Surface

Code, 3 characters

TKSURF describes the test track surface. If a test is performed over a photo pit, the type of surface surrounding the pit, which would primarily affect post impact trajectories, is indicated.

11. TKCOND — Test Track Condition

Code, 3 characters

TKCOND describes the test track condition.

12. TEMP — Ambient Temperature

Integer, degrees Celsius, -99 to 99

TEMP is the temperature at the test location at the time of the test.

13. RECTYP — Type of Recorder

Code, 3 characters

RECTYP is the type of data recorder being used in the test.

14. LINK — Data Link to Recorder

Code, 3 characters

LINK is the type of connection from the transducer to the recorder.

15. CLSSPD — Closing Speed

Real, kilometers per hour, 0 to 200.00

CLSSPD is the actual (measured) closing speed reached by vehicle 1 before impact with a barrier. For two-vehicle impacts, CLSSPD is the velocity of approach of the two centers of gravity before contact

16. IMPANG — Impact Angle

Integer, degrees, 0 to 360

IMPANG is the impact angle, measured as the magnitude of the angle between the longitudinal axis of vehicle 2 and the longitudinal axis of vehicle 1 or a barrier in a clockwise direction. A head-on impact is defined as 0 degrees and is the reference point for angle measurement. All impact angles are between 0 and 359 degrees, except rollover tests, for which IMPANG is assigned blank.

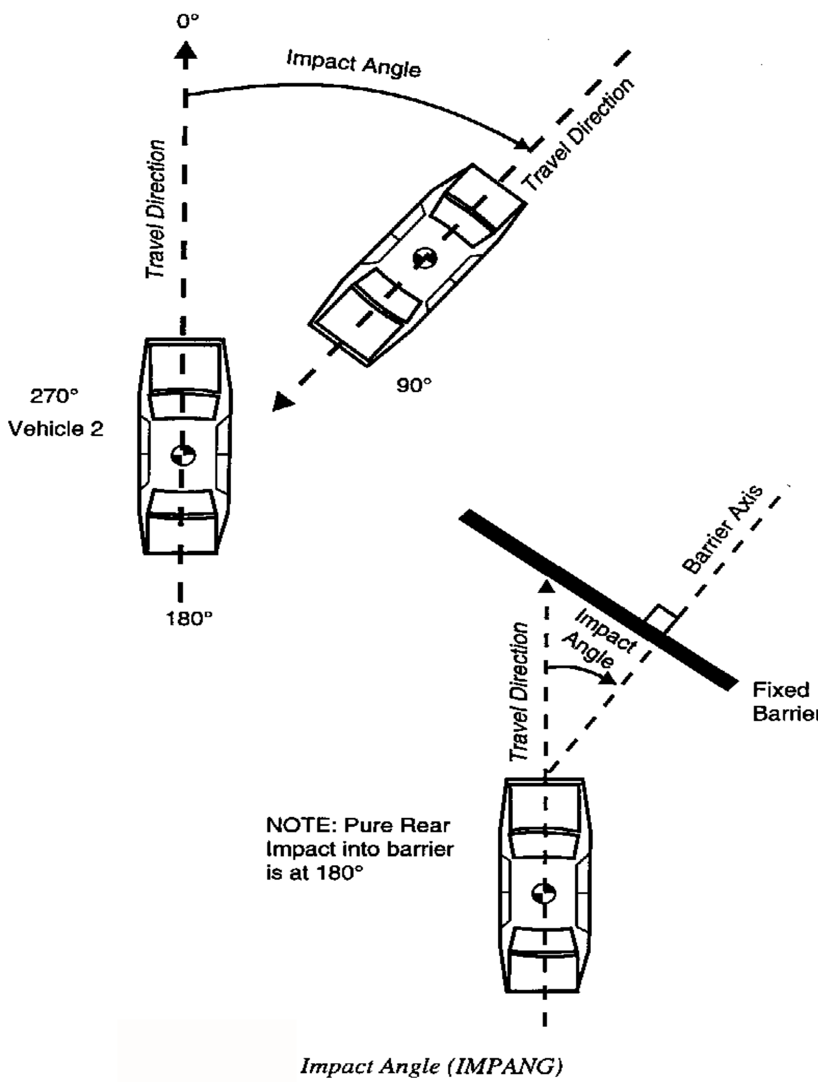

Figure 2-2 IMPANG - Impact Angle

17. OFFSET — Offset Distance

Integer, millimeters, -9,999 to 9,999

OFFSET is the distance between the centerlines of a vehicle and another vehicle, an impactor, or a narrow, fixed object, such as a pole. Offset is applicable only in the case of frontal or rear end collisions and when the longitudinal axes of the vehicles or barrier are parallel. Offsets to the right of the centerline of vehicle 1 are defined to be positive whereas offsets to the left of the centerline of vehicle 1 are defined to be negative. The following figure shows samples of possible offsets. OFFSET is equal to 0.0 in the case of front-to-front or front-to-rear collisions in which no offset occurs. In the case of side impacts, OFFSET is NOT APPLICABLE and should be left blank.

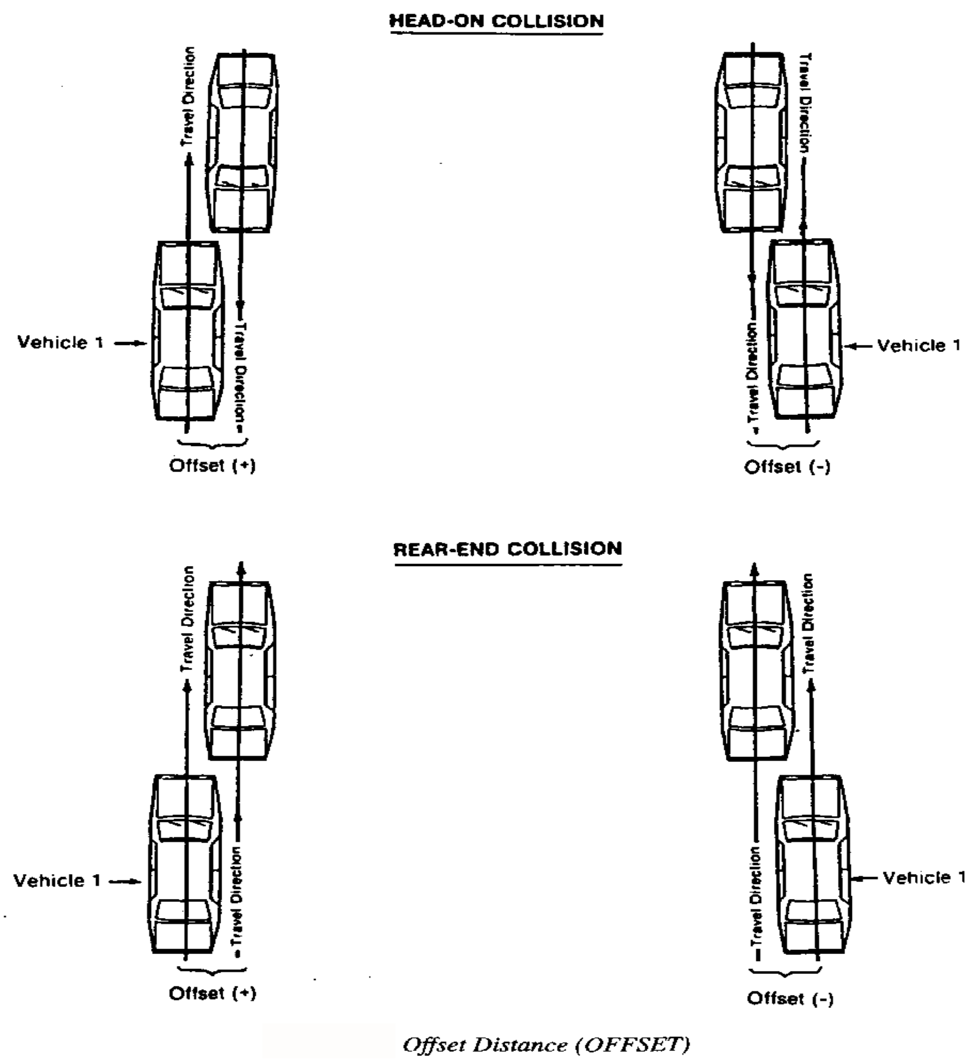

Figure 2-3 OFFSET - Offset Distance

18. IMPPNT — Side Impact Point

Integer, millimeters, -9,999 to 9,999

IMPPNT is the point on the side of vehicle 2 where it is impacted by the longitudinal centerline of vehicle 1. The point of impact is measured from the center of gravity of vehicle 2.

This distance is positive when the point is in front of the center of gravity and negative when it is behind the center of gravity. The following figures shows an illustrative case, in which vehicle 2 is struck from both sides indicating both positive and negative IMPPNTs.

IMPPNT applies only to side collisions.

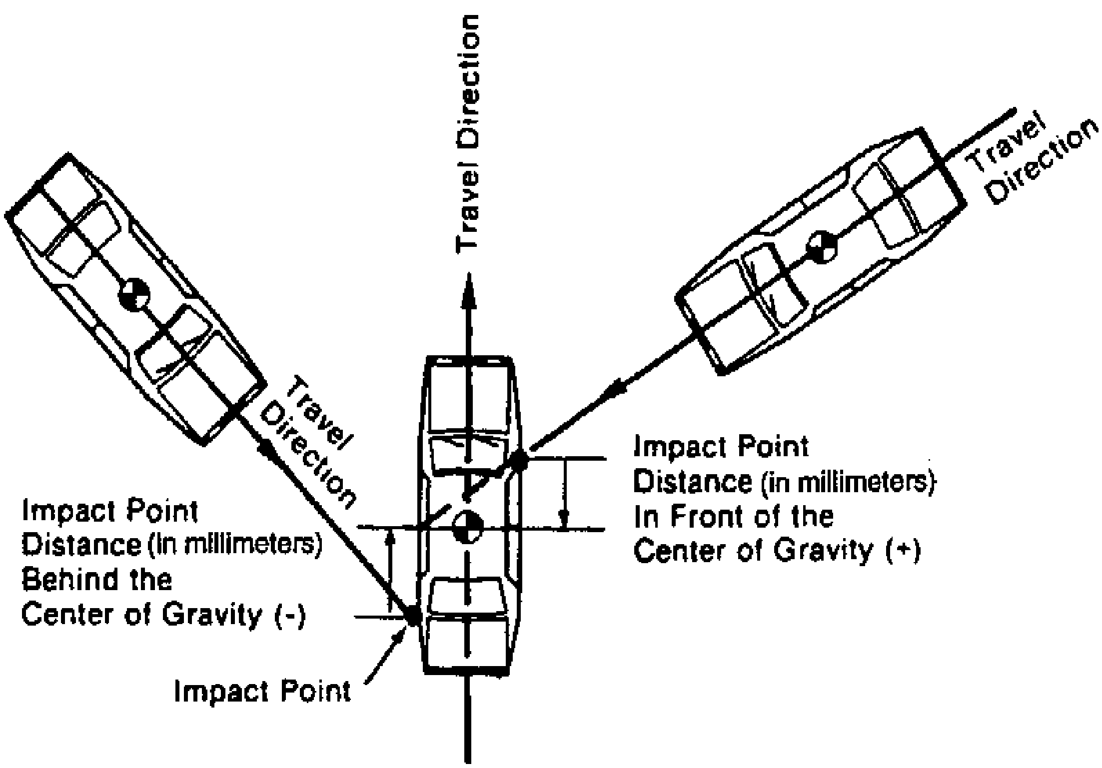

Figure 2-4 IMPPNT - Side Impact Point

19. TOTCRV — Total Number of Curves

Integer, 1 to 200

TOTCRV is the total number of recorded instrument channels (curves) in the test.

20. TSTCOM — Test Commentary

Text with or within 70 characters

TSTCOM is used to describe any peripheral test information, for which a code does not exist, including anomalies or problems. The reason for using OTHER or NOT APPLICABLE to a code of this information record should record a commentary as well. If no comments are to be made, give NO COMMENTS (left justified) to this field.

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2.4 Vehicle Information

Fields defined below constitute the vehicle information record. A Field includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "**1**", "**VEHNO** ", "**Test Vehicle Identification Number**", "integer", and "1 or 2" are its order index in the vehicle information record, its name, its brief description, its type and its range, respectively. Any use of the code for “OTHER” should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

1. VEHNO — Test Vehicle Identification Number

Integer, 1 or 2

VEHNO is the number that identifies the vehicle as 1 or 2. See the Introduction for an explanation of the numbering convention ("Conventions for Coding").

2. MAKE — Vehicle Make

Code, 4 characters

MAKE is the manufacturer of the vehicle; for instance, 01 represents a Chevrolet.

3. MODEL — Vehicle Model

Code, 4 characters

MODEL is the model of the vehicle (e.g. a value of 06 represents an Impala.) A model code cannot be input unless MAKE has a valid input.

4. YEAR — Vehicle Model Year

Integer, 1900 to 9999

YEAR is the model year of the vehicle.

5. NHTSANO — NHTSA Number

NHTSA pre-assigned *Code, 9 characters*

NHTSANO is the NHTSA test vehicle numbering system, a nine-character alphanumeric identifier assigned to NHTSA-owned vehicles for the purpose of tracking them through purchase, testing and disposal. A pre-assigned NHTSA number accompanies all vehicles delivered for testing under NHTSA contract.

The first character is alphabetic; prior to 2001, the first two characters were alphabetic. The first character indicates the purchasing office:

C – Compliance
D – Defects
M – Rulemaking
O – MFR Optional Test
P – NCSA
Q – Test Lab Retest
R – Research

The second four-characters indicate the 4-digit model year; prior to 2012, the second character was used to indicate modal year.

The last four characters constitute a manufacturer code, and vehicles purchased go into a sequential order by office.

Manufacturer Code:
0100 – General Motors Corporation
0200 – Ford Motor Company
0300 –Chrysler Corporation/Fiat
0400 – American Motors/Renault
0500 – Imported Vehicles
0600 – Medium Trucks
0700 – Heavy Trucks
0800 – Commercial Buses
0900 – School Buses
1000 – Low Speed/Electric Vehicles
1100 – Trailers
1200 – Motorcycles/ Mopeds
1300 – Multistage/Altered Vehicles
1400 – Campers/Motorhomes
4100 – BMW
4200 – Hyundai/Kia
4300 – Mercedes-Benz
4400 – LandRover/Jaguar
4500 – N/A
4600 – N/A
4700 – N/A
4800 – N/A
4900 – N/A
5100 – Toyota
5200 – Nissan
5300 – Honda
5400 – Mazda

5500 – Subaru
5600 – Mitsubishi
5700 – Isuzu
5800 – Volkswagen
5900 – Volvo

Examples:
Code 0200: Ford
Test order: 3rd
Code **M20130203**: Third Ford tested by Rulemaking (NCAP) in 2013

6. BODY — Body Type

Code, 2 characters

BODY is the body type of the vehicle. A four-door sedan would be coded as 4S.

7. VIN — Manufacturer Vehicle Identification Number

Text with or within 20 characters

VIN is the identification number of the vehicle that has been assigned by the manufacturer.

8. ENGINE — Engine Type

Code, 4 characters

ENGINE represents the engine type of the vehicle. 4CEF would represent a four-cylinder inline front engine.

9. ENGDSP — Engine Displacement

Real, liters, 0.0 to 9,999.9

ENGDSP indicates the engine displacement within the vehicle, measured in liters - for instance, 2.2 LITERS.

10. TRANSM — Transmission Type

Code, 2 characters

TRANSM is the type of transmission in the vehicle.

11. VEHTWT — Vehicle Test Weight

Integer, kilograms, 0 or positive

VEHTWT is the measured test weight of the vehicle or the impactor including all loads.

12. CURBWT — Vehicle Curb Weight

Integer, kilograms, 0 or positive

VEHTWT is the total weight of a vehicle with standard equipment, all necessary operating consumables (e.g., motor oil and coolant), a full tank of fuel, while not loaded with either passengers or cargo.

13. WHLBAS — Wheelbase

Integer, millimeters, 0 or positive

WHLBAS is the measured or published value of the vehicle or impactor's wheelbase.

14. VEHLEN — Vehicle Length

Integer, millimeters, 0 or positive

VEHLEN is the measured or published value for the length of the vehicle or impactor.

15. VEHWID — Vehicle Width

Integer, millimeters, 0 to 9,999

VEHWID is the measured or published maximum width of the vehicle or impactor.

16. VEHCG — Vehicle Center of Gravity Distance Behind Front Axle

Integer, millimeters, 0 to 9,999

VEHCG is the distance from the front axle to the center of gravity, measured along the longitudinal axis to the front axle of the vehicle or impactor. To calculate this distance value, multiply the weight on the rear wheels by the wheelbase and divide the product by the total weight.

17. STRSEP — Steering Column Shear Capsule Separation

Code, 2 characters

STRSEP indicates the post-test degree or presence of steering column shear capsule separation in the vehicle. A code of SP would indicate that separation has occurred.

18. COLMEC — Steering Column Collapse Mechanism

Code, 3 characters

COLMEC is the steering column collapse mechanism of the vehicle. For example, convoluted tube would be coded as CON.

19. MODIND — Vehicle Modification Indicator

Code, 1 character

MODIND is the vehicle modification indicator of the vehicle; for instance, P would indicate an unmodified production vehicle.

20. MODDSC — Description of Vehicle Modification

Text with or within 70 characters

MODDSC is the description of modifications to the vehicle. Structural, interior, or restraint system modifications are described in this data. If the vehicle has not been modified in any way, enter UNMODIFIED.

21 – 41. BX1 - BX21 — Pretest Vehicle Measurement Data

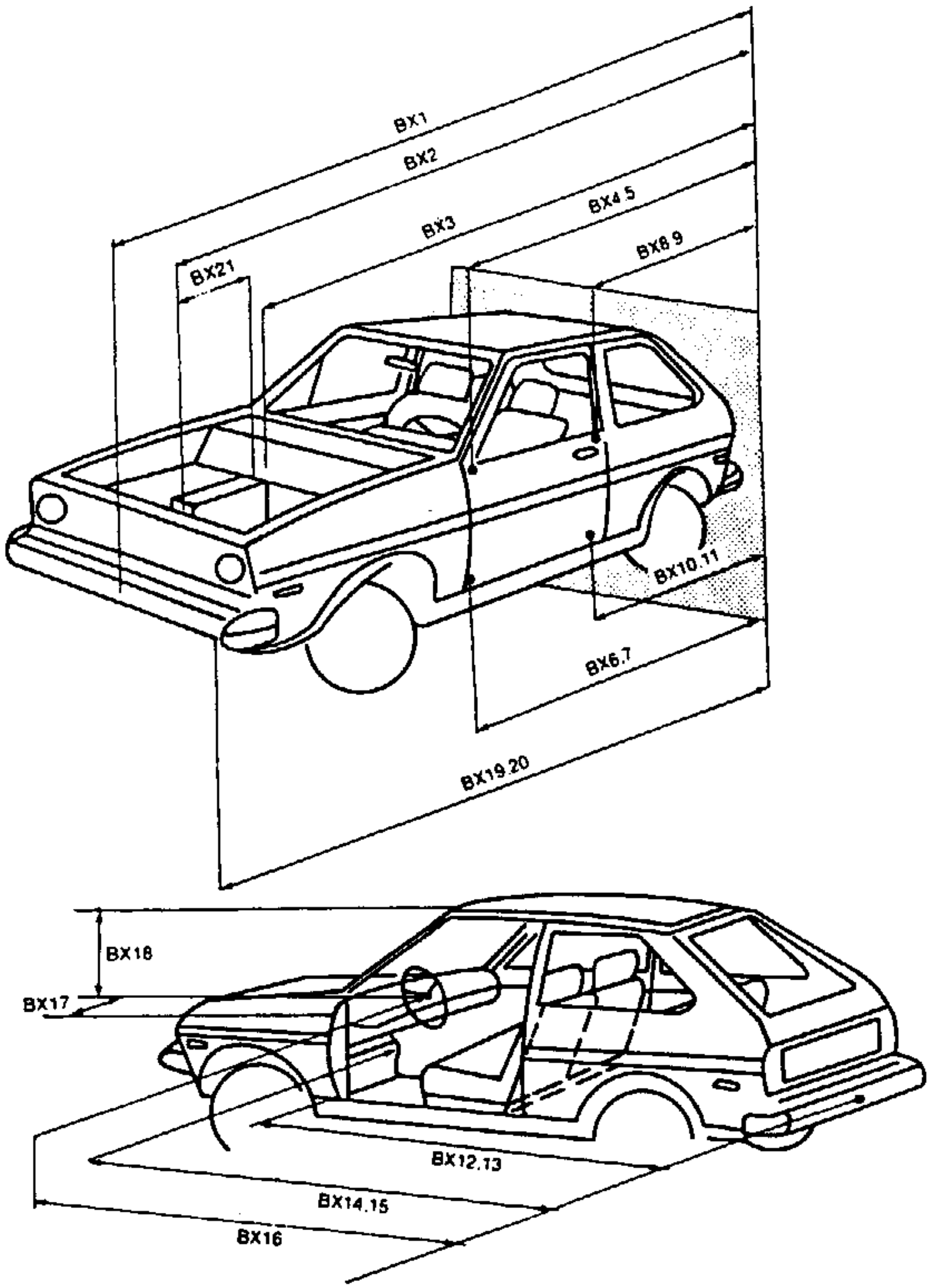
Integer(s), millimeters, 0 to 9,999

The specification data BX1 through BX21 represent a range of vehicle measurements required for determining the extent of damage to the vehicle. The measurements taken before testing are the length of the vehicle and distances between vehicle components:

21. BX1 - Total Length of Vehicle at Centerline
22. BX2 - Rear Surface of Vehicle to Front of Engine
23. BX3 - Rear Surface of Vehicle to Firewall
24. BX4 - Rear Surface of Vehicle to Upper Leading Edge of Right Door
25. BX5 - Rear Surface of Vehicle to Upper Leading Edge of Left Door
26. BX6 - Rear Surface of Vehicle to Lower Leading Edge of Right Door
27. BX7 - Rear Surface of Vehicle to Lower Leading Edge of Left Door
28. BX8 - Rear Surface of Vehicle to Upper Trailing Edge of Right Door
29. BX9 - Rear Surface of Vehicle to Upper Trailing Edge of Left Door
30. BX10 - Rear Surface of Vehicle to Lower Trailing Edge of Right Door

31. **BX11** - Rear Surface of Vehicle to Lower Trailing Edge of Left Door
32. **BX12** - Rear Surface of Vehicle to Bottom of A Post of Right Side
33. **BX13** - Rear Surface of Vehicle to Bottom of A Post of Left Side
34. **BX14** - Rear Surface of Vehicle to Firewall, Right Side
35. **BX15** - Rear Surface of Vehicle to Firewall, Left Side
36. **BX16** - Rear Surface of Vehicle to Steering Column
37. **BX17** - Center of Steering Column to A Post
38. **BX18** - Center of Steering Column to Headliner
39. **BX19** - Rear Surface of Vehicle to Right Side of Front Bumper
40. **BX20** - Rear Surface of Vehicle to Left Side of Front Bumper
41. **BX21** - Length of Engine Block

Figure 2-5 on the next page illustrates these measurements:



Pretest Measurement Data (BX1 - BX21)

Figure 2-5 BX1 - BX21 - Pre-test Vehicle Measurement Data

42. VEHSPD — Vehicle Speed

Real, kilometers per hour

VEHSPD is the resultant speed of the vehicle immediately before impact.

43. CRBANG — Crabbed Angle

Integer, degrees, 0 to 359

CRBANG is the magnitude of the crabbed angle measured clockwise from the longitudinal axis to the velocity vector of the vehicle. The angle is between 0 degrees and 359 degrees.

The crabbed angle will normally be 0 (forward motion) unless a special test method is employed to introduce an initial yaw. The following figure shows an example of CRBANG in which the direction of travel of the vehicle does not correspond to the longitudinal axis.

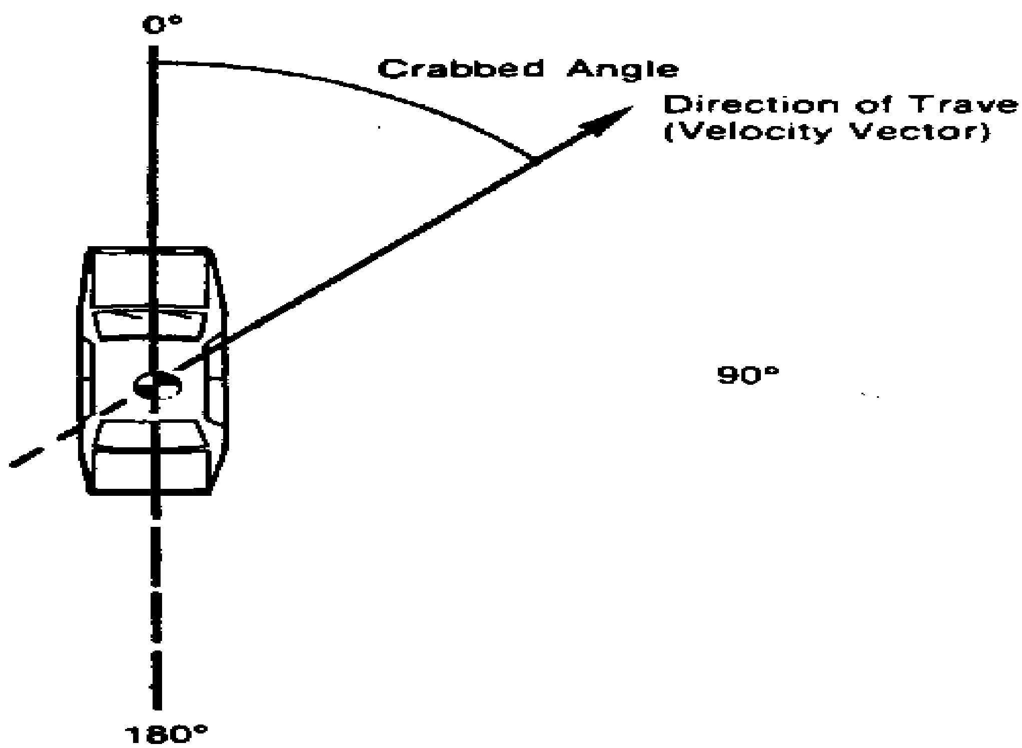


Figure 2-6 CRBANG - Crabbed Angle

44. PDOF — Principal Direction of Force

Integer, degrees, 0 to 359

PDOF is the angle (measured clockwise positive) between the vehicle's longitudinal axis and the impulse vector. The angle is between 0 degrees and 359 degrees.

The principal force is the resultant of forces acting on the vehicle at the point of application. The following figure shows an example of the impulse vector resulting from an impact to a forward-moving vehicle from the left side.

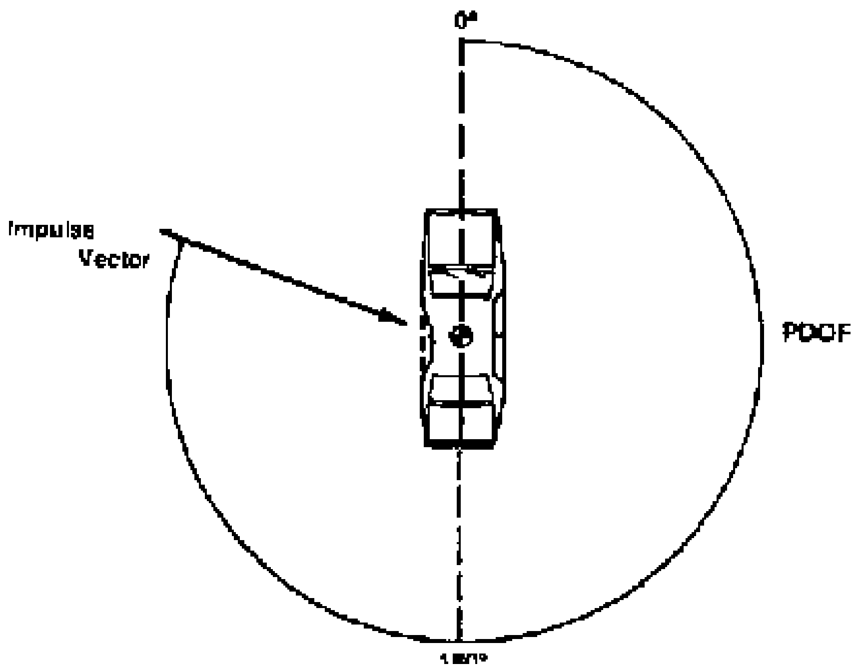


Figure 2-7 PDOF - Principal Direction of Force

45. BMPENG — Bumper Engagement

Code, 2 characters

BMPENG describes the bumper engagement of vehicle 1 and vehicle 2. BMPENG applies only to collisions in which two vehicles moving along the same longitudinal axis collide. A code of DE would indicate direct engagement of the bumpers.

46. SILENG — Sill Engagement

Code, 2 characters

SILENG is the engagement of the side sill (rocker panel area) of vehicle 2 by the bumper of vehicle 1. SILENG applies only to side impacts.

47. APLENG — A-Pillar Engagement

Code, 2 characters

APLENG describes the engagement of the A-pillar of a vehicle that has been impacted from the side. APLENG applies only to side impacts.

48 – 53. DPD1-DPD6 — Damage Profile Distances

Integer(s), millimeters, -9,999 to 9,999

Figure 2-8 and ***Figure 2-9***, shown on the following pages, illustrate the crush profile of the damaged vehicle. The dimensions of the crush are determined by finding the values of L, D, and the DPDs. L is the length of the damaged area. D is the distance from the midpoint of L to the vehicle center of gravity, measured laterally from the X-axis for frontal damage and longitudinally from the Y-axis for side damage. DPD (damage profile distance) specifies the depth of the crush. (L and D are represented elsewhere in the coding as LENCNT and DAMDST.)

The DPDs are a series of points that define the dimensions of the crush. Equally spaced, the DPDs represent damage profile distance points from which the depth of crush is measured. The depths are measured from the outline that the vehicle would follow were it not damaged to the final crushed position.

Figure 2-8 portrays the two dimensional coordinate system employed in estimating the crush dimensions. As an illustrative example, in ***Figure 2-8***, a vehicle has sustained frontal and right side damage.

To determine D for the right side damage, the length of the damage L, is measured and divided in half, to locate the midpoint of the damage; the distance from the midpoint of L to the lateral, or Y, axis is then measured to determine the value of D. To determine D for the frontal damage, L is measured and divided in half-, the distance from the midpoint of L to the longitudinal, or X, axis is measured, yielding the value of D.

Figure 2-9 shows DPD dimensions for frontal and right side damage. The DPDs are equally spaced along the length of L (L is divided into five equal parts if six points are necessary to estimate the damage; four points are used if the length of the damage is 400 mm or less.)

For side impacts, the six DPD measurements are numbered from the rear to the front. DPD I corresponds to the beginning of the damage. Unless the damage includes the rear comer of the vehicle, DPD I is 0.0. Unless the damage extends to the front comer, DPD 6 is 0.0. For front and rear damage, the DPD measurements are taken from the vehicle's left to the vehicle's right.

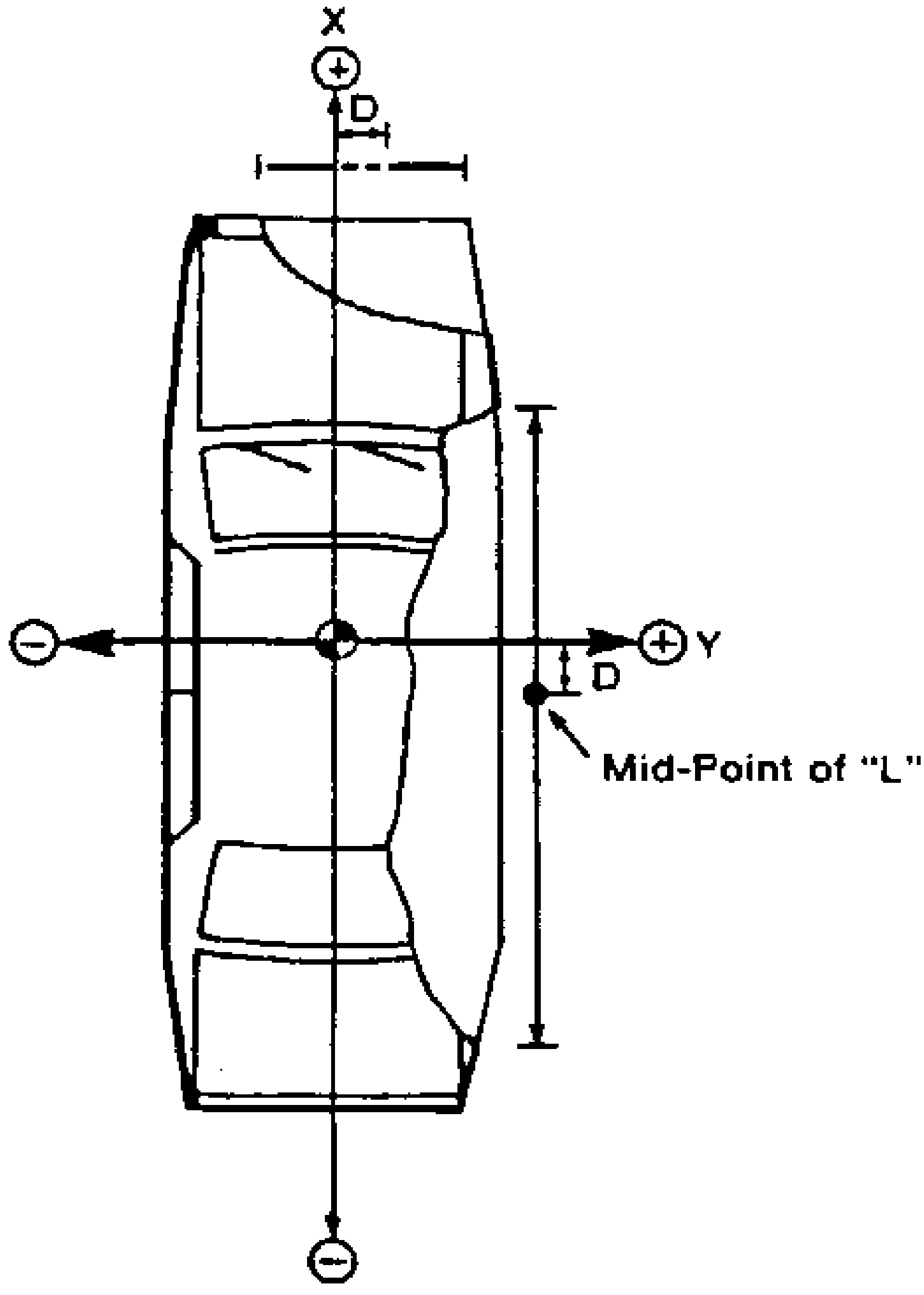


Figure 2-8 DPD Coordinate System

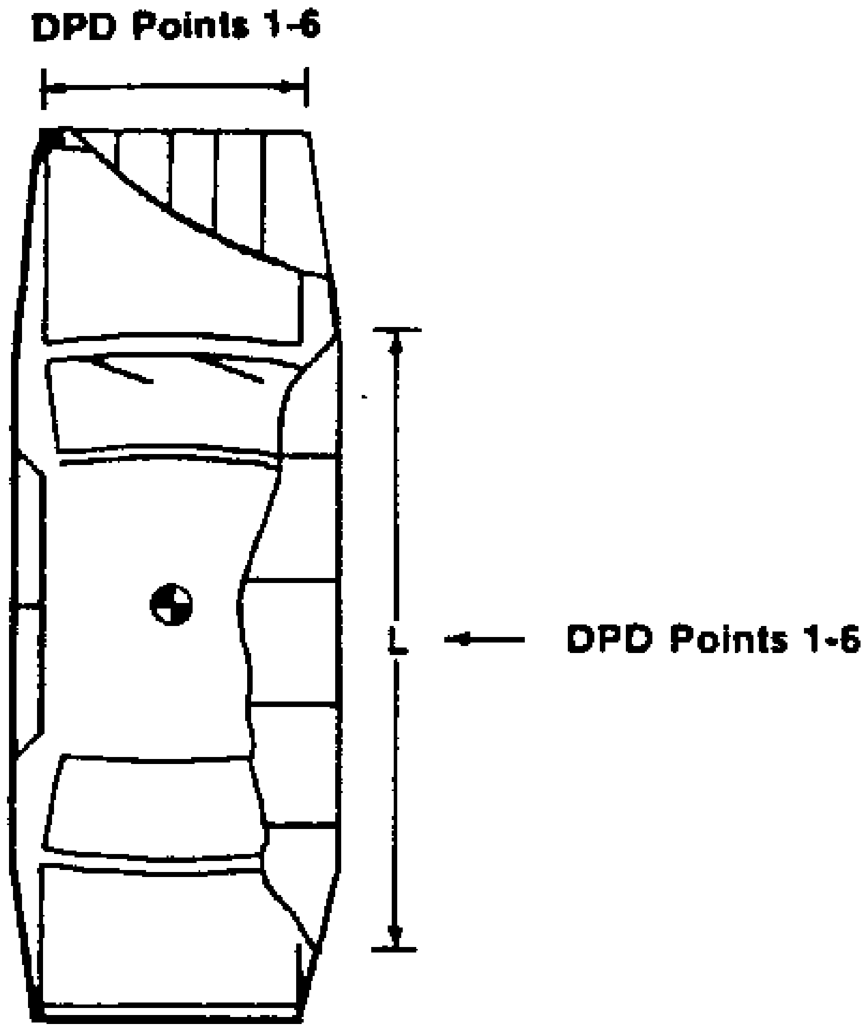


Figure 2-9 DPD Dimensions for Frontal and Right Side Damage

54. VDI — Vehicle Damage Index for Collision Deformation Classification

Text, fixed length, 7 characters

VDI is the vehicle damage index.

SAE Recommended Practice (SAE J224a), 'Collision Deformation Classification' uses this index, composed of seven categories of information, as a basis for uniformly classifying the extent of deformation caused in vehicle accidents.

55. LENCNT — Total Length of Indentation

Integer, millimeters, 0 or positive

LENCNT is the length of the total contact damage incurred by the vehicle. ***Figure 2-10***, on the next page, shows an example of how the total length of the indentation is the combination of direct and induced damage.

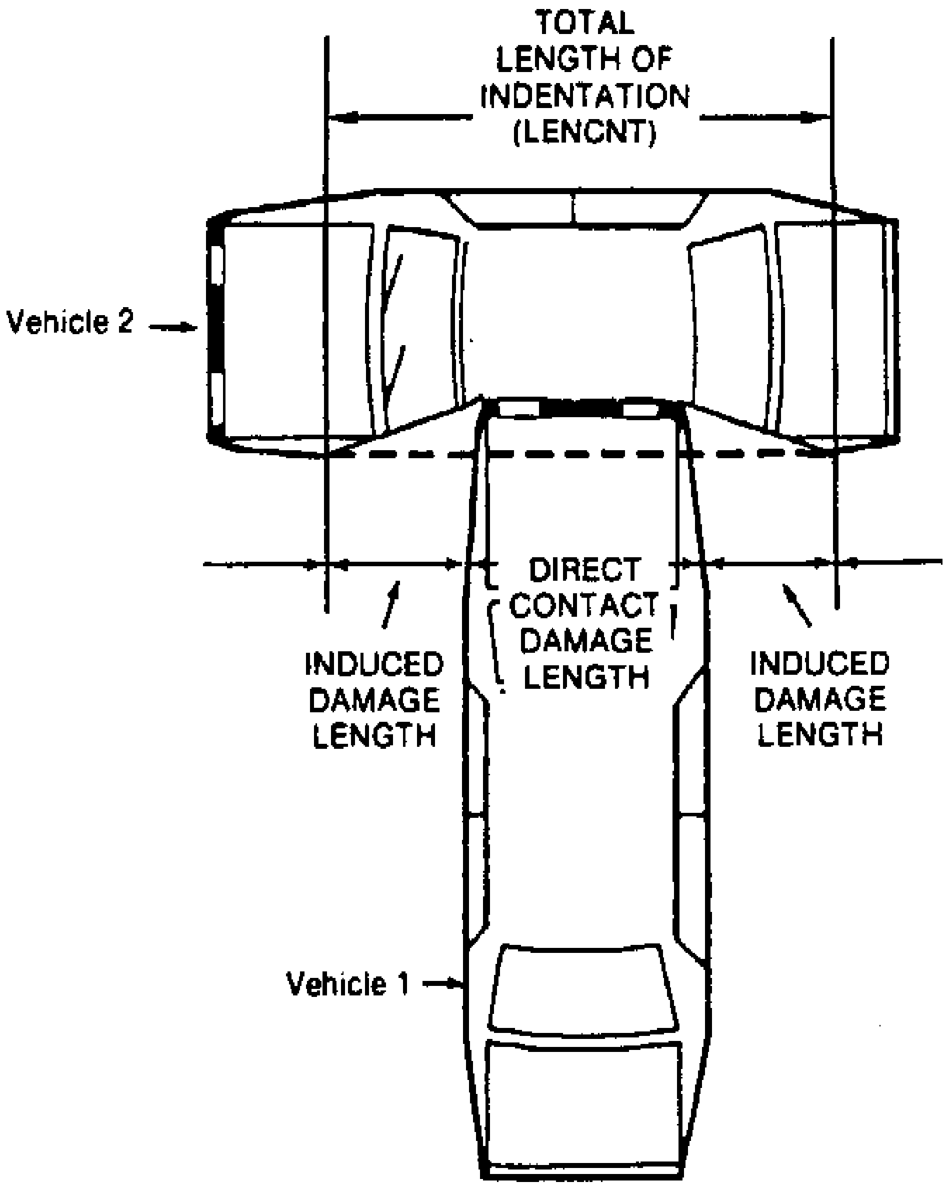


Figure 2-10 LENCNT – Total Length of Indentation

In that example, vehicle 1 impacts vehicle 2. The portion of vehicle 2 that is in direct contact with vehicle 1 represents the direct damage length; while the induced damage is that damage to vehicle 2 that results from the impact but that is not in direct contact with vehicle 1.

This definition for the total length of indentation is used except in the following examples:

If a vehicle impacts a vehicle or barrier at 0 degrees (full-frontal impact), the total length of indentation cannot be greater than the width of the vehicle.

If a vehicle impacts a narrow object, such as a pole, and if the vehicle 'wraps around' the object such that the total length of indentation is less than the width of the object, then the corrected total length of indentation will be the width of the object.

56. DAMDST — Distance Between Centers of Damaged Area and Gravity Axis

Integer, millimeters, 0 to 9,999

DAMDST is the distance between the center of the damaged area and the center of gravity axis. The measurement is made along the longitudinal axis for side damage and along the lateral axis for frontal damage.

If the center-most point of damage is to the right or front of the center of gravity, the distance is positive. If the center-most point of damage is to the left or rear of the center of gravity, the distance is negative. In estimating front or rear damage, assume that the center of gravity lies on the centerline.

57. CRHDST — Maximum Crush Distance

Integer, millimeters, 0 to 9,999

CRHDST indicates the maximum static crush distance (damage penetration), regardless of its location.

58 – 78. AX1 - AX21 — Post-test Vehicle Measurement Data

Integer(s), millimeters

The data AX1 through AX21 represent a range of vehicle measurements required for determining the extent of damage to the vehicle. The measurements taken after testing involve the length of the vehicle and distances between vehicle components:

58. AX1 - Total Length of Vehicle at Centerline
59. AX2 - Rear Surface of Vehicle to Front of Engine
60. AX3 - Rear Surface of Vehicle to Firewall
61. AX4 - Rear Surface of Vehicle to Upper Leading Edge of Right Door
62. AX5 - Rear Surface of Vehicle to Upper Leading Edge of Left Door
63. AX6 - Rear Surface of Vehicle to Lower Leading Edge of Right Door
64. AX7 - Rear Surface of Vehicle to Lower Leading Edge of Left Door
65. AX8 - Rear Surface of Vehicle to Upper Trailing Edge of Right Door
66. AX9 - Rear Surface of Vehicle to Upper Trailing Edge of Left Door
67. AX10 - Rear Surface of Vehicle to Lower Trailing Edge of Right Door
68. AX11 - Rear Surface of Vehicle to Lower Trailing Edge of Left Door
69. AX12 - Rear Surface of Vehicle to Bottom of A Post of Right Side
70. AX13 - Rear Surface of Vehicle to Bottom of A Post of Left Side
71. AX14 - Rear Surface of Vehicle to Firewall, Right Side
72. AX15 - Rear Surface of Vehicle to Firewall, Left Side
73. AX16 - Rear Surface of Vehicle to Steering Column
74. AX17 - Center of Steering Column to A Post
75. AX18 - Center of Steering Column to Headliner
76. AX19 - Rear Surface of Vehicle to Right Side of Front Bumper
77. AX20 - Rear Surface of Vehicle to Left Side of Front Bumper
78. AX21 - Length of Engine Block

Figure 2-11 illustrates the post-test values for AX1 – AX21.

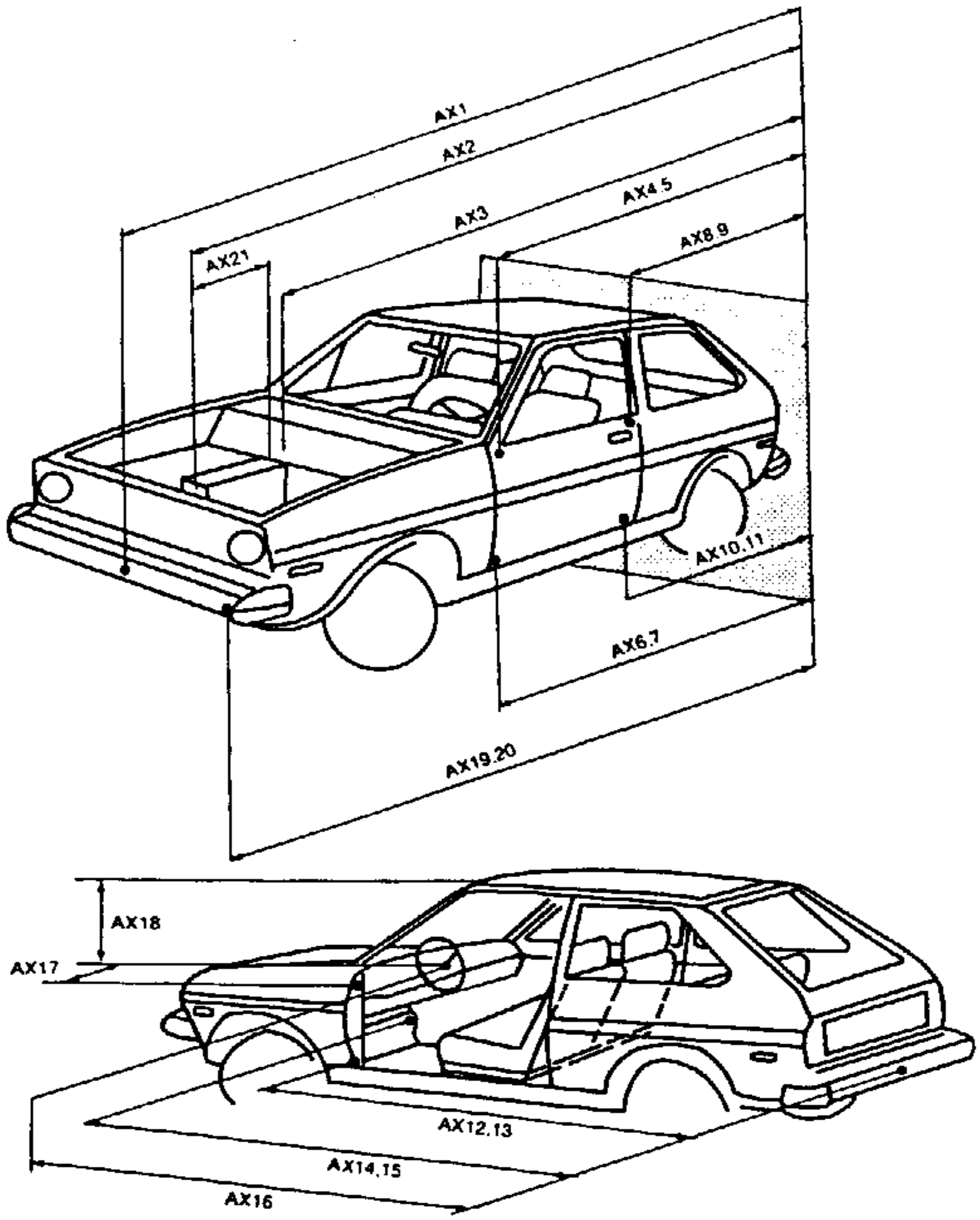


Figure 2-11 AX1 - AX21 - Post-test Vehicle Measurement Data

79. CARANG — Angle of Moving Test Cart

Integer, degrees, 0 to 359

CARANG is the magnitude of the angle between the surface of a rollover test cart and the ground. The standard angle specified in FMVSS 208 is 23 degrees.

80. VEHOR — Vehicle Orientation on Moving Cart

Integer, degrees, 0 to 90

VEHOR is the magnitude of the angle of the vehicle orientation in relation to the test cart surface. If the vehicle is positioned sideways on the cart, the magnitude of the angle of orientation is defined as 90 degrees, according to FMVSS 208. The angle is between 0 degrees and 90 degrees, as illustrated in the figure below.

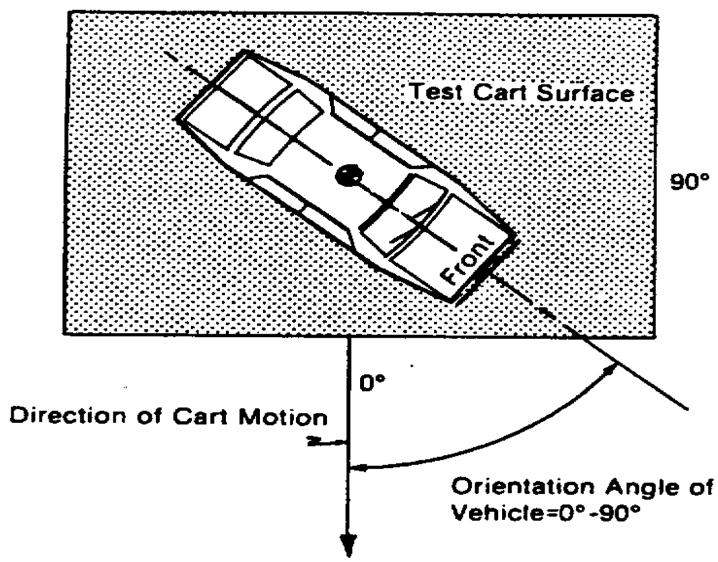


Figure 2-12 VEHOR - Vehicle Orientation on Moving Cart

81. VEHCOM — Vehicle Commentary

Text with or within 70 characters

VEHCOM is used to describe any special features of the vehicle. The reason for using OTHER or NOT APPLICABLE to a code of this information record should record a commentary as well. If no comments are to be made, assign NO COMMENTS to this data.

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2.5 Barrier Information

Fields defined below constitute the barrier information record. This information record applies only to a fixed object that doesn't move, such as a bridge rail, a flat angled barrier, a flat barrier, a guard rail, a guard rail terminal; an impact attenuator, a load cell barrier, a luminare, a median barrier, a pole, a rollover ramp, or a sign support.

A field includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "**1**", "**BARRIG**", "**Rigid or Deformable Barrier**", and "Code, 1 *character* " are its order index in the barrier information record, its name, its brief description, its type, respectively. It has only one character, and its range is a set of valid codes defined for NHTSA R & D. Any use of the code for "OTHER" should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

1. BARRIG — Rigid or Deformable Barrier

Code, 1 character

BARRIG indicates a rigid or deformable barrier.

2. BARSHP — Barrier Shape

Code, 3 characters

BARSHP indicates the type of barrier.

3. BARANG — Angle of Fixed Barrier

Integer, degrees, 0 to 90

BARANG is the magnitude of the contact angle between the vehicle path and the perpendicular to a barrier that is fixed and flat. If the vehicle path and the perpendicular are the same, the magnitude of the angle is 0. All other possibilities from 0 to 90 degrees are positive.

4. BARDIA — Diameter of Pole Barrier

Integer, millimeters, 0 to 9,999

BARDIA is the diameter of a pole barrier.

5. BARCOM — Barrier Commentary

Text with or within 70 characters

BARCOM is further commentary on a particular barrier test procedure. For instance, if the barrier is deformable, a brief indication of the design and force/deflection characteristics could be indicated here. The reason for using OTHER or NOT APPLICABLE to a code of this information record should record a commentary as well. If no comments are to be made, assign NO COMMENTS to this field.

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2.6 Occupant Information

Fields defined below constitute the occupant information record. This information record may be omitted from the data submission if no occupant was present for the test.

A field includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "**1**", "**VEHNO** ", "**Test Vehicle Identification Number**", "integer", and "1 or 2" are its order index in the occupant information record, its name, its brief description, its type and its range, respectively. Any use of the code for "OTHER" should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

1. VEHNO — Test Vehicle Identification Number

Integer, 1 or 2

VEHNO is the number that identifies the vehicle containing the test occupant as 1 or 2.

2. OCCLOC — Occupant Location

Code, 2 characters

OCCLOC indicates the location of the test occupant in the vehicle. A code of 01 would be entered for a left front seat passenger (driver).

3. OCCTYP — Occupant Type

Code, 2 characters

OCCTYP is the type of test occupant, such as the type of dummy or other occupant including a cadaver or human volunteer. A code of SD would be used for an HSRI side impact dummy.

4. OCCAGE — Occupant Age

Integer, 0 to 99

OCCAGE is the age of the non-dummy test occupant that applies to a cadaver or human volunteer.

5. OCCSEX — Occupant Sex

Code, 1 character

OCCSEX is the sex of the test occupant, applicable to all test occupants except child dummies.

6. OCCHT — Occupant Height

Integer, millimeters, 0 to 9,999

OCCHT is the height of the non-dummy test occupant, measured as the test occupant stands.

7. OCCWT — Occupant Weight

Integer, kilograms, 0 to 999

OCCWT is the weight of the non-dummy test occupant.

8. MTHCAL — Method of Calibration

Code, 2 characters

MTHCAL indicates which method was used to calibrate the dummy test occupant. A standard Part 572 calibration would be coded as P5.

9. DUMSIZ — Dummy Size Percentile

Code, 2 characters

DUMSIZ indicates the size of the dummy test occupant, measured either as a standard size percentile or by age classification for child dummies.

10. DUMMAN — Dummy Manufacturer

Text with or within 70 characters

DUMMAN is the manufacturer and the serial number of the dummy occupant. The information should be entered as MFG: (manufacturer's name), S/N (dummy serial number).

11. DUMMOD — Dummy Modification

Text with or within 70 characters

DUMMOD is the description of the modifications to a prototype dummy test occupant. If no modifications were made, enter UNMODIFIED.

12. DUMDSC — Description of the Dummy

Text with or within 70 characters

DUMDSC is the description of the calibration and substitution of parts in a dummy test occupant. If no comments are to be made, assign NO COMMENTS to this data.

13 - 25. CLEARANCE DISTANCES - Clearance Distances between Test Occupant and Vehicle Components

Integer(s), millimeters, 0 to 9,999

Clearance distances are the distances between the test occupant and the interior components of the vehicle before the test is conducted. Each dimension is generally defined below and illustrated in ***Figure 2-13*** and ***Figure 2-14*** for front and rear seat test occupants, respectively.

13. HH — Head to Windshield Header

It is the distance from the point where the nose meets the forehead (between the eyes) to the farthest point forward on the header. It is applicable to front seat occupants only.

14. HW — Head to Windshield

It is the horizontal distance from the point where the nose meets the forehead (between the eyes) to the point on the windshield immediately in front of the test occupant. It is applicable to front seat occupants only.

15. HR — Head to Side Header

It is the shortest distance from the point where the nose meets the forehead (between the eyes) to the header (or pillar) immediately to the side of the test occupant. It is applicable to front and rear seat occupants.

16. HS — Head to Side Window

It is the horizontal distance from the point where the nose meets the forehead (between the eyes) to the point on the window (or pillar) immediately to the side of the test occupant. It is applicable to front and rear seat occupants.

17. CD — Chest to Dash

It is the horizontal distance from the chest of the test occupant (near the sternum) to the dash-panel. It is applicable to front seat occupants only.

18. CS — Chest to Steering Wheel

It is the distance from the chest (near the sternum) to the hub of the steering wheel for a test occupant seated in the driver's position. It is applicable to front seat driver side occupants only.

19. AD — Arm to Door

It is the horizontal distance from the midpoint of the upper arm to the door or the side of the vehicle immediately to the side of the test occupant. It is applicable to front and rear seat occupants.

20. HD — Hip to Door

It is the horizontal distance from the hip (H-point) to the door or the side of the vehicle immediately to the side of the test occupant It is applicable to front and rear seat occupants.

21. KD — Knees to Dash

It is the shortest distance from the center of the knee pivot bolt's outer surface to the lower dash panel immediately in front of the test occupant. It is applicable to front seat occupants only.

22. HB — Head to Seatback

It is the horizontal distance from the point where the nose meets the forehead (between the eyes) to the seatback immediately in front of the test occupant. It is applicable to rear seat occupant only.

23. NB — Neck to Seatback

It is the horizontal distance from the neck to the seatback immediately in front of the test occupant. It is applicable to rear seat occupants only.

24. CB — Chest to Seatback

It is the horizontal distance from the chest (near the sternum) to the seatback immediately in front of the test occupant. It is applicable to rear seat occupants only.

25. KB — Knee to Seatback

It is the horizontal distance from the center of the knee pivot bolt's outer surface to the back of the front seat. It is applicable to rear seat occupants only.

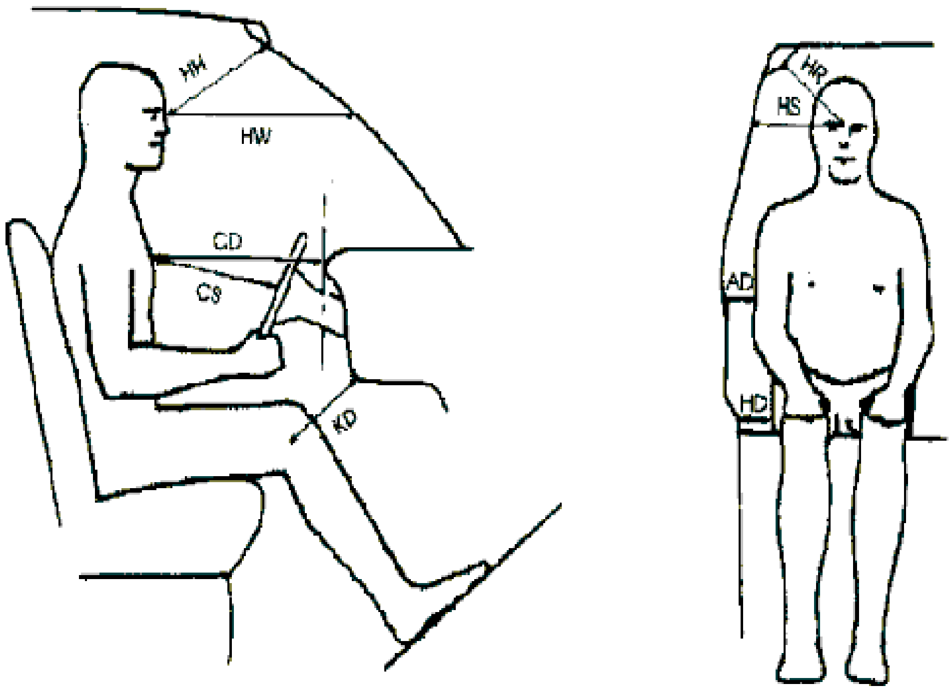

Figure 2-13 Front Seat Occupant Clearance Distances

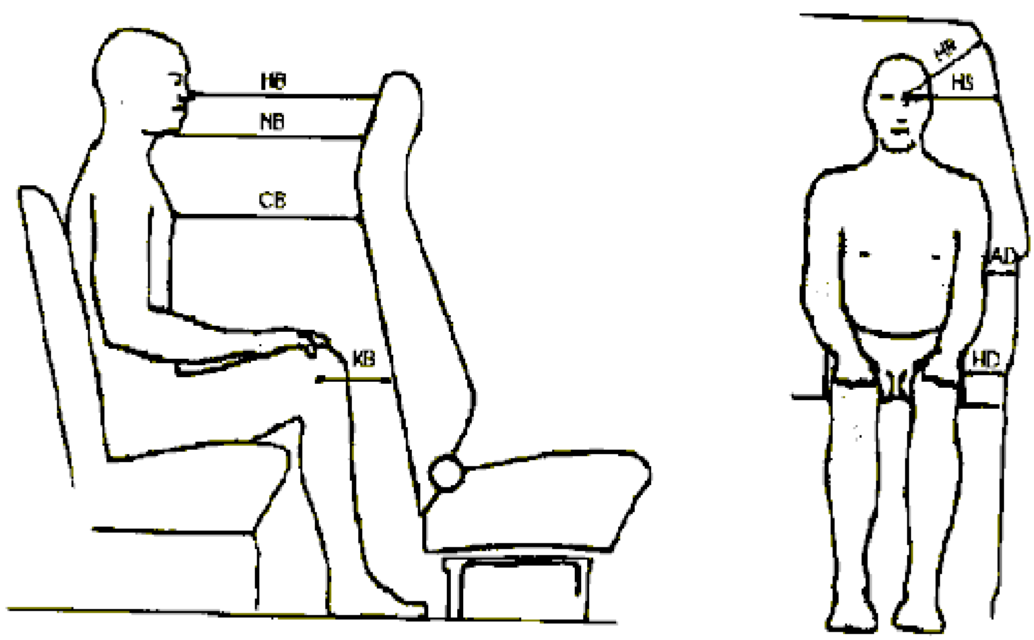

Figure 2-14 Rear Seat Occupant Clearance Distances

26. SEPOSN — Seat Position

Code, 2 characters

SEPOSN is the position of the seat at the initiation of the test.

27. CNTRH1 — First Contact Region for Head

Code, 2 characters

CNTRH1 is the first point of contact for the test occupant's head.

28. CNTRH2 — Second Contact Region for Head

Code, 2 characters

CNTRH2 is the second point of contact for the test occupant's head.

29. CNTRC1 — First Contact Region for Chest or Abdomen

Code, 2 characters

CNTRC1 is the first point of contact for the test occupant's chest or abdomen.

30. CNTRC2 — Second Contact Region for Chest or Abdomen

Code, 2 characters

CNTRC2 is the second point of contact for the test occupant's chest or abdomen.

31. CNTRL1 — First Contact Region for Legs

Code, 2 characters

CNTRL1 is the first point of contact for the test occupant's legs.

32. CNTRL2 — Second Contact Region for Legs

Code, 2 characters

CNTRL2 is the second point of contact for the test occupant's legs.

33. HIC — Head Injury Criterion

Integer, 0 to 9,999

HIC is used for injury measures. It is the computed value of the head injury criterion, based on the resultant acceleration pulse for the head center of gravity. In computing this value, the contractor shall use the HIC algorithm supplied by NHTSA.

34. T1 — Lower Boundary of HIC Time Interval

Real, milliseconds, 0 or positive

T1 is used for injury measures. It is the lower boundary of the time interval over which the HIC was computed.

35. T2 — Upper Boundary of HIC Time Interval

Real, milliseconds, 0 or positive

T2 is used for injury measures. It is the upper boundary of the time interval over which the HIC was computed.

36. CLIP3M — Thorax Region Peak Acceleration Measurement

Real, G'S, 0 or positive

CLIP3M is used for peak-load measures. It is the maximum 3-millisecond 'clip' value of the chest resultant acceleration, in g's, after filtering with a Class 180 filter (300 Hz Butterworth, low pass, refer to SAE Standard J211 B). In computing the CLIP3M measurement, the contractor shall use the 'clip' algorithm supplied by NHTSA.

37. LFEM — Left Femur Peak Load Measurement

Integer, Newton, negative or 0

LFEM is used for peak-load measures. It indicates the maximum compression load for the left femur. It is listed as a negative number.

38. RFEM — Right Femur Peak Load Measurement

Integer, Newton, negative or 0

RFEM is used for peak-load measures. It indicates the maximum compression load for the right femur. It is listed as a negative number.

39. CSI — Chest Severity Index

Integer, 0 or positive

CSI is used for injury measures. It indicates the computed value of the chest severity index.

40. LBELT — Lap Belt Peak Load Measurement

Integer, Newton, 0 or positive

LBELT is used for peak-load measures. It indicates the maximum tension load on the lap belt

41. SBELT — Shoulder Belt Peak Load Measurement

Integer, Newton, 0 or positive

SBELT is used for peak-load measures. It indicates the maximum tension load on the shoulder belt.

42. TTI — Thoracic Trauma Index

Real, 0 or positive

TTI is used for injury measures. It is the thoracic trauma index value. For a dummy, TTI(d) is computed from the maximum rib and lower spine peak accelerations. In computing this value, the contractor shall use the TTI algorithm supplied by NHTSA.

43. PELVG — Pelvic G's

Real, 0 or positive

PELVG, the pelvis injury criterion, is used for injury measures. It is the peak lateral acceleration on the pelvis. It is obtained after filtering with the FIR100 filtering software supplied by NHTSA.

44. OCCCOM — Occupant Commentary

Text with or within 70 characters

OCCCOM is used to describe any distinguishing features of the test occupant. The reason for using OTHER or NOT APPLICABLE to a code of this information record should record a commentary as well. If no comments are to be made, enter NO.

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2.7 Occupant Restraints Information

Fields defined below constitute the occupant restraint information record. A Fields includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "**1**", "**VEHNO** ", "**Test Vehicle Identification Number** ", "integer", and "1 or 2" are its order index in the occupant restraint information record, its name, its brief description, its type and its range, respectively. Any use of the code for “OTHER” should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

Occupant restraint information is required for each test occupant. For unrestrained occupants, RESTYP = NON. Belts should be recorded only if they were used in the test. Inflatable restraints should be recorded whether the test resulted in deployment or not. If an occupant is protected by three restraints, e.g. a 3-point belt, and front and side air bags, three restraint records should be generated for that occupant.

1. VEHNO — Test Vehicle Identification Number

Integer, 1 to 2

VEHNO is the number that identifies the vehicle containing the test occupant as 1 (striking vehicle) or 2 (target vehicle).

2. OCCLOC — Occupant Location

Code, 2 characters

OCCLOC indicates the location of the test occupant within the vehicle. A code of 01 would be entered for a left front seat driver.

3. RSTNO — Restraint Number

Integer, 1 to 9

RSTNO is the sequential number assigned to each restraint system <u>in use</u> for a given occupant at the time of the test. RSTNO = 1 for the first restraint listed for each occupant.

4. RSTTYP — Restraint Type

Code, 3 characters

RSTTYP is the type of restraint system <u>in use</u> at a given occupant location. Inflatable restraints are considered to be “in use” for occupied seating positions.

5. RSTMNT — Restraint Mount

Code, 2 characters

RSTMNT indicates the interior component(s) to which the restraint is mounted or from which it originates. For a driver frontal air bag, RSTMNT is the steering wheel hub (SH). Side air bags/air belts could be mounted in the seatback (SB), door (DR), or side header (HS).

6. DEPLOY — Inflator/Belt Pre-tensioner Deployment

Code, 2 characters

DEPLOY describes the deployment performance of inflatable restraints or the firing of the belt pre-tensioner during the test.

7. RSTCOM — Restraint Commentary

Text with or within 70 characters

RSTCOM is used to describe any distinguishing features of the restraint system. If OTHER is used to a code of this information record, descriptive information may be added here. If no comments are to be made, enter NO COMMENTS here.

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2.8 Instrumentation Information

Fields defined below constitute the instrumentation information record. A Field includes its order index in the record, name, brief description, type and valid range. For example, in the second field, "**2**", "**CURNO**", "**Curve Number**", "integer", and "1 to 999" are its order index in the information record, its name, brief description, its type and its range, respectively. Any use of the code for "OTHER" should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

Approximately twenty milliseconds of data prior to time zero should come with all signal (curve or channel) data; data shall meet the class 1000 specifications of the SAE J211 recommendation; and all data should be truncated at a common time value to avoid extending the pulse well past the period of significant activity.

The minimum sample rate shall be 10000 Hz. A sample rate should be chosen such that the DELT value does not have to be rounded off.

1. VEHNO — Test Vehicle Identification Number

Integer, 0 to 2

VEHNO is the number that identifies the vehicle containing the sensor as 1 or 2. VEHNO should be coded 0 if the sensor is attached to a barrier.

2. CURNO — Curve Number

Integer, 1 to 999

CURNO is the sequential number (1,2,3…) assigned to a specific sensor and data curve.

3. SENTYP — Sensor Type

Code, 2 characters

SENTYP indicates the type of sensor used for collecting the measurements at the time of the test, such as AC for accelerometer.

4. SENLOC — Sensor Location

Code, 2 characters

SENLOC indicates the location of the test occupant or corresponding occupant restraint to which the sensor is attached. SENLOC should correspond to a previously entered value of OCCLOC.

5. SENATT — Sensor Attachment

Code, 4 characters

SENATT indicates where the sensor is attached. For example, the code APLR would be entered for an attachment on the right A-pillar.

6. AXIS — Axis Direction of the Sensor

Code, 2 characters

AXIS is the axis direction for sensors measuring vector quantities as described in ***Appendix A : Data Coordinate System***. The global coordinate systems are vehicle fixed; the local systems are local within the vehicle global system. With respect to the vehicle longitudinal axis, X is positive forward, Y is positive right, (toward the passenger's door) and Z is positive down. These can differ depending on the component. For example, with the steering assembly, positive X is down the column axis and Y is positive right (toward the passenger's door).

AXIS is always applicable when the measurement is a vector quantity such as acceleration, force, velocity, and so forth. Note that the head accelerometer array is a local coordinate system. The distance, *d*, is the length of the arm between HD90 and HD9Y, measured along the Y arm. The reporting of this value of *d* is described in the INSCOM. The length of the X arm and the Z arm are reported in the same manner. All signals from anatomical sensors, (HDCG, etc.), are local coordinate systems.

7. XUNITS — Time Units or 'Independent Axis' Units

Code, 3 characters

XUNITS indicates either the unit of time for time series sensor data (e.g. 'SEC'), or the units of the independent coordinate of a non-time series signal (e.g. If a load is applied in a controlled fashion to produce a deflection, the load is the independent coordinate, and the deflection is the dependent coordinate).

8. YUNITS — Data Measurement Units

Code, 3 characters

YUNITS indicates the units used to measure the signal of the sensor data.

9. PREFIL — Pre-filter Frequency

Integer, 0 or positive

PREFIL is the cutoff frequency in Hz of a low-pass filter (digital or analog) applied to the signal. This frequency is defined as where filter gain equals 70 percent (-3db.)

10. INSMAN — Manufacturer of the Instrument

Text with or within 70 characters

INSMAN describes the manufacturer of the instrument. The model and serial number should also be included. The format for this data should be: MFG: manufacturer name, S/N: serial number.

11. CALDAT — Calibration Date

Date, format (DD/MMM/YYYY), 11 characters

CALDAT is the most recent calibration date of the instrument. *This field must be filled with a valid date.* **Don't leave it blank, please.**

12. INSRAT — Instrument Rating

Unbounded integer

INSRAT represents the maximum value that can be accurately measured by the recording system for a channel. INSRAT should be in the same units as the data channel, except in the case of barrier load cell data where the unit of INSRAT is kilo-Newtons.

13. CHLMAX — Channel Maximum Rating

Integer, 0 to 999

CHLMAX represents the full-scale value of the data based upon the actual test setup, including signal conditioning, as a percentage of INSRAT, and may exceed 100%.

14. INIVEL — Initial Velocity

Real, kilometers per hour, - 200 to 200

INIVEL is the initial (time zero) velocity of the sensor along its axis and applies only to linear accelerometers. If the sensor is a load cell attached to a barrier, the entry for this data should be zero (0.0).

15. NFP — Number of First Point

Integer, -10,000 to 0

NFP represents the index number of the first point in the data array (less than or equal to 0). Time zero always has an index number of 0. If no data exists prior to time zero, NFP is equal to 0; if 20 data points exist prior to time zero, NFP is equal to -20. There may never be more than 10,000 points before time zero.

16. NLP — Number of Last Point

Integer, 0 or positive

NLP represents the index number of the last point in the data array. If 1,000 points were digitized, and NFP is equal to -100, then NLP is equal to 899. NLP can never be greater than 99,999.

17. DELT — Time Increment

Integer, microseconds, 0 or positive

DELT is the time increment in microseconds between each data point. DELT is assumed to be constant for all data points for a given sensor (uniform sampling frequency).

18. DASTAT — Data Status

Code, 2 characters

DASTAT indicates the status of the data as it appears in the data submission. This data is used to indicate a signal which is invalid (code MN for meaningless), or which becomes questionable or invalid part of the way through a signal (code CF and explained in INSCOM). If a signal is computed, DASTAT is CM. An example of a computed signal would be the resultant acceleration or the rotational acceleration of the head measured with a nine linear accelerometer array.

19. CHSTAT — Channel Status

Code, fixed length, 1 character

CHSTAT indicates whether the data channel is primary or redundant. If, for example, the dummy is instrumented with a backup tri-axial accelerometer in the head, the redundant channels should be labeled R. The occupant's HIC value would be calculated using the primary head channels, labeled P.

20. INSCOM — Instrumentation Commentary

Text with or within 70 characters

INSCOM is any further commentary on an instrumentation information record and its correlated signal data, including any unusual conditions affecting the data or a reference to a document that describes problems with a particular curve. The reason for using OTHER or NOT APPLICABLE to a code of this information record should record a commentary as well. If no comments are to be made, enter NO COMMENTS.

For Head 9 array accelerometers, INSCOM contains dimensions that precisely locate the given instrument. The HD90, X-axis accelerometer, will locate the center of the Head 9 array relative to the head CG; then the entry in INSCOM for HD90 would read: CG: X: 33MM, Y: 2.5MM, Z: -5.0 MM.

The X-axis of HD9Y, HD9X, and HD9Z will contain the distance, d (**See: *Figure A-3 Nine-Accelerometer Coordinate System***), which is the length of the arm. Units must be shown. For example, if the Y arm is 110 mm long, then the entry in INSCOM for HD9Y, X direction would read: Y-ARM: 110 MM.

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2.9 Intrusion Information

Fields defined below constitute the intrusion information record. This information record may be omitted from the data submission if no intrusion information was present for the test.

The coordinate system for intrusion data is based on SAE J211 vehicle and laboratory coordinates. The *x*-direction is positive from the back of the vehicle to the front of the vehicle. The *y*-direction is positive from the left of the vehicle to the right of the vehicle. The *z*-direction is positive from the top of the vehicle to the ground. The frame of reference for the vehicle coordinate system is the non-deforming part of the vehicle. The before and after impact data are in millimeters in the range - 10,000 to 10,000 millimeters. Intrusion data BIX, BIY, BIZ, AIX, AIY and AIZ are based on this coordinate system.

A field includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "**1**", "**VEHNO** ", "**Test Vehicle Identification Number**", "integer", and "1 or 2" are its order index in the intrusion information record, its name, its brief description, its type and its range, respectively. Any use of the code for "OTHER" should be explained in an appropriate commentary field. If the value or content of the field is undetermined and filling the field is not enforced, leave it blank.

1. VEHNO - Test Vehicle Identification Number

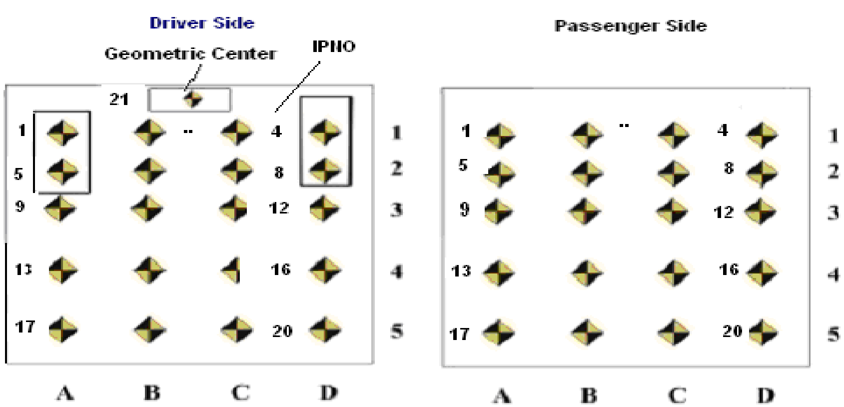
Integer, 1 or 2

VEHNO is the number that identifies the vehicle containing the test occupant as 1 or 2.

2. IPNO - Intrusion Point Number

Code, integer, 0 to 25

IPNO indicates a unique intrusion point number further identifies an intrusion point within each possible intrusion point location. The coded toe pan intrusion points are displayed below.



3. IPLOC - Intrusion Point Location

Code, one character

IPLOC indicates one of three intrusion point locations:
- the vehicle's steering column,
- the driver side toe-pan, and
- the passenger side toe-pan.

The intrusion point location codes are identified in the following table:

IPLOC	Description
C	Steering Column
D	Driver Side
P	Passenger Side

The measurement at each intrusion point must be taken according to the following guidelines:

***(a)* Driver Side**

(a.1) Toe pan and floorboard measurements:

- Locate and mark point D1 (Column D row) or IPLOC 4: Project a line 45 degrees (from the horizontal) down and forward from the center of the top accelerometer pedal in the x-z plane until the line intersects the interior of the vehicle. Mark this point by cutting a small "v" in the carpet and underlying padding and peeling back and exposing the floor. The carpet and padding are then refitted prior to crash.
- ST plane: The ST plane is a y-z plane that passes through the front edge of the right seat track.
- AP1 plane: The AP1 plane is a y-z plane that passes through point D1.
- AP2 plane: The AP2 plane is an x-z plane that passes through point D1.
- AP3 plane: The AP3 plane is an x-y plane that passes through point D1.
- MP plane: The MP plane is a y-z plane located halfway between the ST plane and AP1 plane.
- CF plane: The CF plane is an x-z plane that passes through the center of the footrest. If there is no visible footrest locate the x-z plane to pass through a point located 64 mm measured along the MP plane in the y-direction from the intersection of the doorsill and floorboard.
- BP plane: The BP plane is an x-z plane that passes through the center of the brake pedal.
- TP plane: The TP plane is n y-z plane at the intersection of the BP plane and the intersection of the toe pan and floorboard.
- Column A is at the intersection of the vehicle and the CF plane.
- Column D is at the intersection of the vehicle and the AP2 plane.
- Row 1 is at the intersection of the vehicle and the AP3 plane.
- Row 3 is at the intersection of the vehicle and the TP plane.
- Row 5 is at the intersection of the vehicle and MP plane.
- Columns B and C is evenly spaced between Columns A and D.

- Row 2 is evenly spaced between Row 1 and Row 3.
- Row 4 is evenly spaced between Row 3 and Row 5.
- Map and mark the points on the vehicle interior.

(a.2) Additional points:

- Mark the center of the brake pedal.
- Mark the left upper IP located above where dummy's knees contact dash.
- Mark the right upper IP located above where dummy's knees contact dash.
- Mark the center of the steering wheel.
- Mark the front outboard seat attachment point.

(b) **Passenger Side**

(b.1) Toe pan and floorboard measurements:

- All driver side points are mapped to the passenger side from the central line of the vehicle.

(b.2) Additional points:

- Mark the left upper IP located above where dummy's knees contact dash.
- Mark the right upper IP located above where dummy's knees contact dash.
- Mark the front outboard seat attachment point.

4 - 6. BIX, BIY, BIZ – Coordinates Before Intrusion

Integer, millimeters, *-10,000 to 10,000*

BIX, BIY and BIZ indicate the *x*, *y* and *z* coordinates in pretest measurement, respectively.

7 - 9. AIX, AIY, AIZ – Coordinates After Intrusion

Integer, millimeters, *-10,000 to 10,000*

BIX, BIY and BIZ indicate the *x*, *y* and *z* coordinates in posttest measurement, respectively.

10. TSTREF - Test Reference Number

Text with or within 10 characters

TSTREF is an alphanumeric code number assigned to the test by the test performer. It is the same data shear with the TSTREF in the general test information record.

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2.10 High-Speed Video Information

Fields defined below constitute the high-speed video information record. This information record contains data from each camera used in the test.

A field includes its order index in the record, name, brief description, type and valid range. For example, in the first field, "**1**", "**CAMNO**", "**Camera Number**", "integer" and "0 to 99" are its order index in the high-speed video information record, its name, its brief description, its type and range, respectively. Any use of the code for “OTHER” should be explained in an appropriate commentary field.

1. CAMNO — Camera Number

Integer, 0 to 99

CAMNO indicates the order number of cameras used in the test. For example, "1" indicates that the video was taken by camera 1.

2. TSTREF — Test Reference Number

Text with or within 10 characters

TSTREF is an alphanumeric code number assigned to the test by the test performer. It is the same data as TSTREF in the general test information record.

3. VSCFACTOR — Video Frame Number Scale Factor

Positive Real

VSCFACTOR is the scale factor to be applied against the integer frame number of a sequential image file, as described below, in order to convert the integer frame sequence value into a time value in seconds. A value of zero (0) may be entered if sequential frames are not stored at constant intervals of time as with force-deflection data.

4. VIEWDESC — View Description

Text with or within 70 characters

VIEWDESC describes the view of this high-speed video camera (example ‘front left view’, or ‘overhead view’)

5. COMMENTS — Camera Commentary

Text, maximum length 70 characters

COMMENTS comments on this particular camera view.

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Chapter 3 : Test Report Format

A written report should be generated for each test to be submitted. This report shall be saved on the submission physical media under the directory:

\REPORT\

with the filename

R<TSTREF>.pdf

where <TSTREF> has the same value as TSTREF in ***Section 2.3 General Test Information*** of this guide.

The report shall preferably be in the Adobe PDF document format (www.adobe.com). Alternatively, a report may be submitted in Microsoft Word 2000 or a later format if the test site is unable to generate a PDF file.

At a minimum, each report shall contain the following information:

1) A cover page including,

    - Title of Study
    - Test Performer
    - Test Reference Number (EV5 specification file - TSTREF)
    - Contract Number
    - Test Date

2) In the main body of the test report, the following items shall be included:

    - A text description and diagram/pictures of the test setup.
    - A table of all injury criteria reported in the EV5 file.
    - A table of intrusion information reported in the IP5 file.
    - Description of camera views and type of media (film/video).
    - Information which could not be included in the EV5 specification file, and that the test engineer and/or COTR deem appropriate or important to mention.

3) In the report Appendix A, the following information shall be included:

    - A diagram describing the coordinate system.
    - A table describing load cell manipulations for positive values.

4) In the report Appendix B, a plot of each curve submitted exactly as it should appear in the database. The plots will be compared with the signal data loaded into the database to ensure that the signals the test laboratory intends to enter into the NHTSA database are not corrupted during the submission and loading process. Each plot should display the maximum and minimum values of the signal and their respective event times.

5) In the report Appendix C, a list of the instrumentation associated with each channel, including transducer, sampling rate, signal conditioning, units and axis.

The COTR or test engineer is encouraged to include any other information that they feel is necessary to make the report meaningful and the quality control process easier. However, the COTR or test engineer may not eliminate any of five (5) minimum requirements outlined above.

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Chapter 4 : Pre- and Post-Event Images

Images and video captured before and after the test may be submitted whether they are digital images or processed film images.

4.1 Digital Images

Digital images and videos of the test before and after the event shall be submitted on the submission media as noted in ***Section 1.1 Media Types and Layout***. Video files shall be submitted under the directory \PREPOST\VIDEOS. Still images shall be submitted under the directory \PREPOST \PHOTOS. File names should be descriptive. Naming convention is at the discretion of the COTR, with the exception that standard file extensions shall be applied to all files as appropriate to the content type of each file.

As an example, TIFF format image files should be named with a file extension of

.tif

while JPEG format image files should be named with a file extension of

.jpg

Digital images shall be submitted in one of the following formats: Windows bitmap (BMP), GIF, TIFF, or JPEG.

4.2 Processed Film Images

Hardcopy processed film images shall be included as an appendix in the report.

If you have data that you wish to submit but which is not specified in this guide, please send email to nrd.softdev@nhtsa.dot.gov.

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Chapter 5 : Event Images, Film, and Video

The procedures for capturing and formatting images of the impact event are described below. Procedures for images captured by high-speed film and high-speed video are outlined below, as well as generic procedures for other event image types.

5.1 High-Speed Film

This section describes procedures for capturing and submitting high-speed film, not digital video. The only content requirements of the high-speed film camera image view specified in this guide are:

1) Somewhere in the image view there should be text denoting the TSTREF described in ***Section 2.3 General Test Information***.

2) Some type of visible time mark should be present to indicate time zero for the test. This time zero should correspond with the time zero on the data acquisition system.

3) Somewhere within the image, the time at which the image was captured shall also be displayed. Alternatively, the use of the LED timing mark available on most high-speed cameras is acceptable.

Processed film should be submitted to NHTSA with the test submission. Multiple camera angles may be submitted on a single reel, or multiple reels may be submitted.

5.2 High-Speed Digital Video

This section describes procedures for capturing and submitting high-speed digital video, not film. The only content requirements of the high-speed video camera image view specified in this guide are:

1) Somewhere in the image view there should be text denoting the TSTREF described in ***Section 2.3 General Test Information***.

2) Some type of visible time mark should be present to indicate time zero for the test. This time zero should correspond with the time zero on the data acquisition system.

3) Somewhere within the image, the time at which the image was captured shall also be displayed.

5.2.1 High-Speed Digital Video Specification File

The High-Speed Video specification (HS5) File contains information about the data from each camera used in the test. The file is a delimited text file similar to the EV5 information file (see ***Section 2.2.1 Structures of Specification Files***) containing information record sets described in ***Section 2.10 High-***

Speed Video Information. Each high-speed video information record shall be written to an HS5 file on a single line. The line shall be terminated by a carriage return. The HS5 file shall be named <TSTREF>.HS5.

5.2.2 Sequential Image and Movie Submission Format

High-speed video data should be submitted in two formats, sequential raster image files and AVI movies.

- **Sequential Bitmap Image Files**

Most high-speed video systems output sequential raster image files, with the frame number denoted within the filename of each file. Each file shall be numbered using the following file naming convention:

F<frame number>.<file format extension>

where

<frame number> is the integer sequential frame number of each image. A minus (-) should prefix the <frame number> for images captured before the start of the event.

<file format extension> is TIF for TIFF format image files, JPG for JPEG format image files, GIF for GIF format image files, and BMP for Windows bitmap files.

- **AVI Files**

For each camera view, AVI movie files shall be generated using a widely available codec agreed upon by the laboratory and the COTR. For help with codec selection, send email to nrd.softdev@nhtsa.dot.gov. Each AVI file shall use the following naming convention:

<TSTREF> C <CAMNO>.avi (no spaces in filename)

5.2.3 Media Format

All high-speed video files shall be stored in the directory \EVENT as described in ***Chapter 1 : Media Formats and Software Tools*** of this guide.

An HS5 file, <TSTREF>.HS5, shall be stored in the directory \EVENT\HSVIDEO on the test submission media with the filename.

High-speed video sequential raster image files and AVI movies shall be placed on the test submission media under \EVENT \HSVIDEO\CAMERA<CAMNO>\, where <CAMNO> is a sequential number assigned to each camera, described in the ***HIGH-SPEED VIDEO INFORMATION*** section.

Example:

Test lab ABC conducted test T1234 that had 3 high-speed video cameras collecting images, each having views of an impact event from the top, right side, and front. Each camera captured TIFF images from -40 to +500 milliseconds in increments of one millisecond. The digital test submission media would have the following directories:

\EVENT\HSVIDEO\CAMERA1\
\EVENT\HSVIDEO\CAMERA2\
\EVENT\HSVIDEO\CAMERA3\

The following files would be included (**example only**):

\EVENT\HSVIDEO\CAMERA1\T1234C1.AVI	(AVI Movie File)
\EVENT\HSVIDEO\CAMERA1\F-40.TIF	(Sequential Bitmap Image File)
…	
\EVENT\HSVIDEO\CAMERA1\F0.TIF	(Sequential Bitmap Image File)
…	
\EVENT\HSVIDEO\CAMERA1\F500.TIF	(Sequential Bitmap Image File)

\EVENT\HSVIDEO\CAMERA2\T1234C2.AVI
\EVENT\HSVIDEO\CAMERA2\F-40.TIF
…
\EVENT\HSVIDEO\CAMERA2\F0.TIF
…
\EVENT\HSVIDEO\CAMERA2\F500.TIF

\EVENT\HSVIDEO\CAMERA3\T1234C3.AVI
\EVENT\HSVIDEO\CAMERA3\F-40.TIF
…
\EVENT\HSVIDEO\CAMERA3\F0.TIF
…
\EVENT\HSVIDEO\CAMERA3\F500.TIF

The contents of the High Speed Video Specification file named T1234.HS5 would be:

```
# Source: High Speed Video Data
# Date: <11/29/2005>
----- HSVD -----
1|T1234|0.001|TOP VIEW|NO COMMENTS
2|T1234|0.001|RIGHT SIDE VIEW|NO COMMENTS
3|T1234|0.001|FRONT VIEW|NO COMMENTS
----- END -----
```

In this example, the frame number scale factor for each camera is 0.001 second.

5.3 Other Event Images

Other event images, such as BETA or VHS tapes, can be included in the test submission packet. Please send email to nrd.softdev@nhtsa.dot.gov if you have any questions about submitting event images not specified in this guide.

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Appendix A: Data Coordinate System

Starting with Version 4 of the NHTSA Test Reference Guides, all submissions will conform to SAE J211/1 MAR95 Instrumentation for Impact Test. Please refer to SAE J211 for a complete description of the coordinate system and signal polarities for vehicle occupants.

A-1. Using the Coordinate System Correctly

The rules for determining the sign conventions described below will enable anyone involved in NHTSA-sponsored testing to determine the proper sign and coordinate axis for any measured quantity.

All coordinate systems are orthogonal, three-dimensional, and right handed. The global coordinate systems for the vehicle and the test occupants are shown in ***Figure A-1*** and ***Figure A-2***. The coordinate system for the nine-accelerometer head array is shown in ***Figure A-3***, along with the proper SENATT (sensor attachment) codes. ***Table A-1*** lists the polarity of the sensor output from various dummy manipulations when using this coordinate system.

A-2. Vehicle Global Coordinate System

- **X** is positive forward
- **Y** is positive right (toward the passenger side door)
- **Z** is positive down

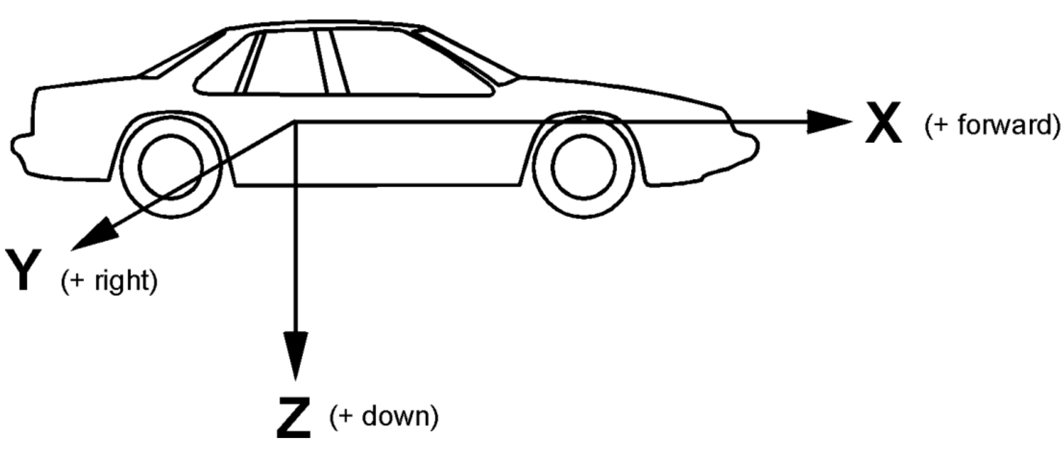

Figure A-1 Vehicle Global Coordinate System

A-3. Occupant Global Coordinate System

- **X** is positive forward (posterior to anterior)
- **Y** is positive right
- **Z** is positive down

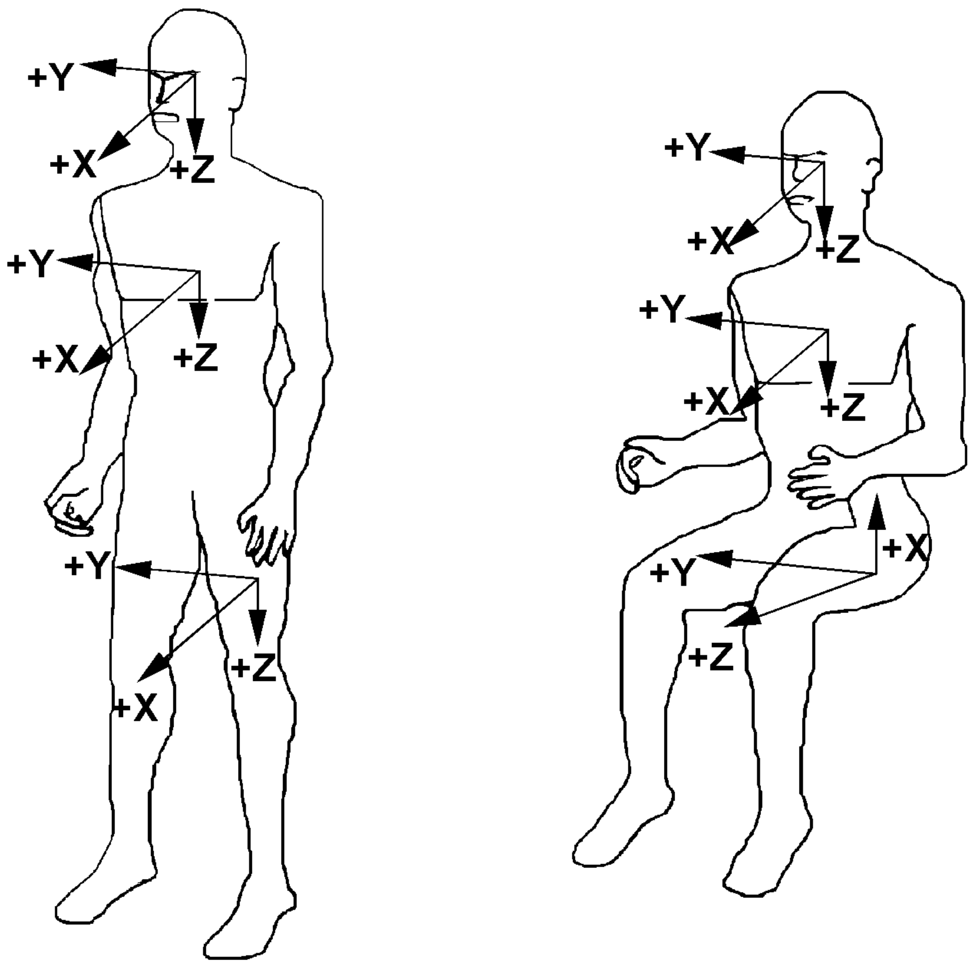

Figure A-2 Occupant Global Coordinate System

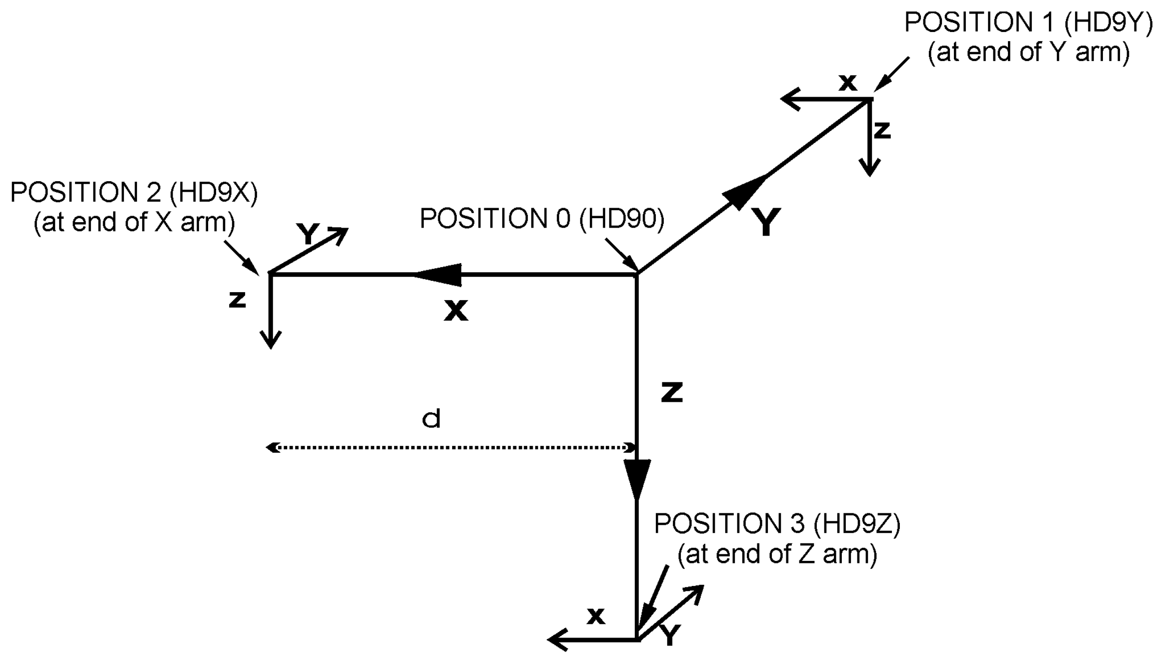

Figure A-3 Nine-Accelerometer Coordinate System

Table A- 1 Dummy Manipulations for Checking Recorded Load Cell Polarity Relative to Sign Convention

Load Cell	Measure	Dummy Manipulations	Polarity
Upper and lower neck loads	Fx	Head rearward, chest forward	+
	Fy	Head leftward, chest rightward	+
	Fz	Head upward, chest downward	+
	Mx	Left ear toward left shoulder	+
	My	Chin toward sternum	+
	Mz	Chin toward left shoulder	+
Left shoulder loads (BIOSID)	Fx	Left shoulder forward, chest rearward	+
	Fy	Left shoulder rightward, chest leftward	+
	Fz	Left shoulder downward, chest upward	+
Right shoulder loads (BIOSID)	Fx	Right shoulder forward, chest rearward	+
	Fy	Right shoulder rightward, chest leftward	+
	Fz	Right shoulder downward, chest upward	+
Clavicle loads	Fx	Shoulder forward, chest rearward	+
	Fz	Shoulder downward, chest rearward	+
Upper and lower	Fx	Chest rearward, Pelvis forward	+
	Fy	Chest leftward, pelvis rightward	+
	Fz	Chest upward, pelvis downward	+

Load Cell	Measure	Dummy Manipulations	Polarity
lumbar spine	Mx	Left shoulder toward left hip	+
	My	Sternum toward front of legs	+
	Mz	Right shoulder forward, left shoulder rearward	+
Sacrum load (BIOSID)	Fy	Left H-point pad leftward, chest rightward	+
Left iliac load (BIOSID)	Fy	Left iliac rightward, chest leftward	+
Right iliac load (BIOSID)	Fy	Right iliac rightward, chest leftward	+
Pubic load (side impact)	Fy	Right H-point pad leftward, left pad rightward	(-)
Crotch belt loads	Fx	Pubic rearward, pelvis forward	(-)
	Fz	Pubic upward, chest downward	(-)
Iliac lap belt loads	Fx	Upper iliac spine rearward, chest forward	(-)
	My	Upper iliac spine rearward, chest forward	+
Left side abdominal load (Eurosid-1)	Fy	Left side of abdomen rightward, chest leftward	+
Right side abdominal load (Eurosid-1)	Fy	Right side of abdomen leftward, chest rightward	(-)
Femur loads (dummy in seated position, femurs horizontal)	Fx	Knee upward, upper femur downward	+
	Fy	Knee rightward, upper femur leftward	+
	Fz	Knee forward, pelvis rearward	+
	Mx	Knee leftward, hold upper femur in place	+
	My	Knee upward, hold upper femur in place	+
	Mz	Tibia leftward, hold pelvis in place	+
Knee clevis	Fz	Tibia downward, femur upward	+
Upper tibia loads	Fz	Tibia downward, femur upward	+
	Mx	Ankle leftward, hold knee in place	+
	My	Ankle forward, bottom of knee clevis rearward	+
Lower tibia loads	Fx	Ankle forward, knee rearward	+
	Fy	Ankle rightward, knee leftward	+
	Mx	Ankle leftward, hold knee in place	+
	My	Ankle forward, bottom of knee clevis rearward	+

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Appendix B: Technical Support Information

B-1. Reference Guide Updates and Software Updates

NHTSA now maintains web sites for the NHTSA Test Reference Guides and the Entree for Windows software. The latest versions of the guides and the software are made available for download from the sites below:

NHTSA Test Reference Guides

http://www.nhtsa.gov/Research/Databases+and+Software/NHTSA+Test+Reference+Guides

Entree for Windows

Entree for Windows | National Highway Traffic Safety Administration (NHTSA)

Because the NHTSA Research and Development web site is a constantly evolving resource it may happen that the links noted above do not work correctly. In the event that this does occur, please utilize the available ***SEARCH*** feature to search for "NHTSA Test Reference Guides" and "Entrée for Windows".

B-2. Requesting Assistance

In the event that a user of the Test Reference Guides requires technical support with using the guides, or has questions about the content of the guides, support is offered via Internet e-mail. Simply send a message to the address

nrd.softdev@nhtsa.dot.gov

with a subject line including the text

ATTN: NHTSA Test Reference Guides

To request assistance with the Entree for Windows software send an e-mail to

nrd.softdev@nhtsa.dot.gov

with a subject line including the text

ATTN: Entrée for Windows

A staff person will acknowledge the request, and we will endeavor to provide a complete response within two (2) business days on a first-come, first-served basis.

B-3. Reporting a Problem

To report a problem or potential bug in either the guides or the Entree for Windows software, please send an e-mail to

nrd.softdev@nhtsa.dot.gov

with a subject line including the text

BUG REPORT: NHTSA Test Reference Guides

or

BUG REPORT: Entrée for Windows

for the Test Reference Guides, or Entrée for Windows, respectively.

A staff person will acknowledge the problem report. For simple problems, we will endeavor to provide a complete response within five (5) business days on a first-come, first-served basis. In the event that correction of a problem requires more than 5 business days we will notify the user in advance.

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